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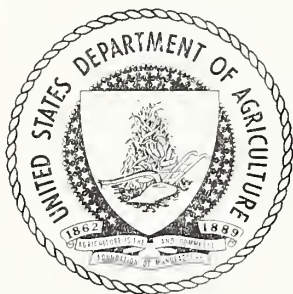
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TIMBER MANAGEMENT PLAN  
BEARTOOTH WORKING CIRCLE  
CUSTER NATIONAL FOREST  
MONTANA



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TIMBER MANAGEMENT PLAN  
BEARTOOTH WORKING CIRCLE  
CUSTER NATIONAL FOREST  
REGION ONE, MONTANA  
1961

A. TITLE AND APPROVAL SHEET

Submitted by: /s/ Glenn H. Mueller 11-24-61  
District Ranger

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District Ranger

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Forester (Timber Mgt.)

Approved by: /s/ John S. Forsman 12- 1-61  
Forest Supervisor

/s/ W. H. Johnson 12-11-61  
Acting Regional Forester

/s/ Edward P. Cliff 12-20-61  
Acting Chief

/s/ DJM

Reviewed by:

Regional Office

Timber Management /s/ GFW 12/11/61

Recreation, Lands &  
Watershed Management /s/ GAM 12/ 8/61

Range and Wildlife Mgt. /s/ MAG 12/ 8/61

Engineering /s/ ALA 12/ 8/61

Fire Control /s/ MET 12/ 8/61

State and Private /s/ KMT 12/ 8/61

Research

Forest Disease /s/ JWK 11/14/61

Forest Insect /s/ DEP 11/14/61

Forest Management /s/ CAW 11/22/61

Washington Office

Timber Management /s/ IJM 12/19/61

Multiple Use Coordination \_\_\_\_\_



Forest Boundary  
 State Line  
 County Line  
 Roads  
 Ranger Station  
 Town  
 Block Boundary





## FOREWORD

The Multiple Use-Sustained Yield Act of June 12, 1960, directs that the renewable resources shall be managed for sustained yield & multiple use; i.e. watershed, timber, range, outdoor recreation, wildlife & fish on national-forest lands. This basic instruction from Congress requires the development and application of sustained yield timber management of the national forests, working circle by working circle. It is the purpose of this plan to apply timber management policies and objectives of national forest administration growing out of related Federal laws, as currently set forth in the Forest Service Manual, to the management of the timber resources of the national-forest lands within the Beartooth Working Circle.

This plan is primarily concerned with the nonreserved national forest ownership. Consideration is also given to the intermingled and adjacent forest lands in other ownership and how they influence local economy.

Basic data for the plan were obtained by field sampling for volume and photointerpreting timber types. This work was done during 1959 and 1960. The statistical accuracy of the sampling was completed within a degree of accuracy of plus or minus 10 percent based on one probability.

The plan was prepared by Glenn H. Mueller, Allan R. Knox, Gene Kalkoske, and Bayard Van Gieson, with technical supervision by the Division of Timber Management.





# C. SUMMARY OF PLAN

## LAND AND TIMBER OWNERSHIP

Ownership	Total	Forest Land		Non-forest	Sawtimber Volumes					Other Products
		Noncom'l	Com'l		Total	D-P	S-AF	IP		
	- - - -	- - Acres	- - -	- - - -	--MMBF (Scribner)--					MMCF
Nat'l Forest										
Nonreserved	417,268	136,787	130,633	149,848	553	294	87	52	120	114
Reserved	166,001	34,241	10,280	121,480						
State	665	150	490	25						
Other Priv.	12,287	3,245	2,376	6,666	7	3	1	1	2	2
TOTAL	596,221	174,423	143,779	278,019	560	297	88	53	122	116

## NET GROWTH AND MORTALITY - NONRESERVED NATIONAL FOREST

Growth Expression	Sawtimber		Other Products	
	/acre/yr.	Total	/acre/yr.	Total
	BF	MMBF	CF	MMCF
Periodic Annual Growth	41	4.2	16	1.6
Periodic Annual Mortality	15	1.5	-	-
Mean Annual Increment (Past)	58	7.6	6	.7
Sustained Yield Capacity	118	15.4	15	2.0
Realizable (70% normal)	82	10.8	11	1.4

## ANNUAL ALLOWABLE CUT FROM NATIONAL-FOREST LANDS

Kind of Cutting	Area by Types				Volume by Types				Other Products
	D-P	S-AF	LP	Total	D-P	S-AF	LP	Total	
	Acres				--MMBF (Scribner)--				M Cords
Harvest	400	270	430	1,100	4,500	2,600	1,900	9,000	13.0
Intermediate	700	100	800	1,600	400	25	175	600	7.0

REVISION DATE: 1971



## D. MANAGEMENT PLAN

### 1. SUMMARY OF RESULTS UNDER PREVIOUS PLANS

No previous plan has been prepared for the Beartooth Working Circle. Despite the lack of a plan, considerable timber has been removed in the past for stulls and other mining timbers with minor volumes being removed for poles, posts, ties and lumber. Logging has been limited by such factors as rugged topography, distance from points of manufacture and markets, lack of roads, and a predominance of low-value species.

### 2. LAND DESCRIPTION

#### a. Location

The Beartooth Working Circle is located in south-central Montana in Carbon, Stillwater, Sweetgrass, and Park Counties. The main drainages are the Stillwater River, Rock Creek, Crooked Creek, and Sage Creek. Billings, the principal community, is located northeast of the area.

#### b. Boundaries

The boundary of the Beartooth Division of the Custer National Forest coincides with the working circle boundary. (See location map at the front of the plan.)

#### c. Subdivisions

(1) Blocks - The working circle is composed of two blocks, the Stillwater and Rock Creek. These blocks coincide with the Stillwater and Rock Creek Ranger Districts.

(2) Compartments - The blocks are further divided into 30 compartments; 14 in the Stillwater Block and 16 in the Rock Creek Block. Compartment boundaries are on topographic features except for the Custer portion of the Beartooth Primitive Area. The average size of compartments is 13,500 acres in the Beartooths (excluding the primitive area units), and 7,500 acres in the Pryors. The three primitive area compartments are larger and embrace several natural topographic units.

#### d. Relation to Other Working Circles

The Ashland Working Circle is located 100 miles to the east of the forest headquarters. The Big Timber Working Circle of the Gallatin National Forest bounds this working circle on the west. The Crow Indian Reservation, containing 71,257 acres of commercial timberland, joins the working circle on the north side of the Pryor Mountains. Approximately 60,000 acres of commercial timberland on the reservation lies in the Wolf Mountains east of Lodgegrass, Montana. The reservation contains no sawmills near the working circle. Parts of it have been cut over extensively for poles and posts, however.

e. Wilderness Area

The Beartooth Primitive Area, containing 166,000 acres, is located wholly within the working circle. An estimated 10,280 acres of productive forest land within this area is not considered in this plan.

3. FOREST DESCRIPTION

a. Land Ownership and Land Class

Land ownership within the working circle is predominantly national-forest land (table 1). All other ownerships combined make up only about two percent of the total area. The other ownership consists mostly of homesteads along the fringes of the working circles and of mining patents in mineralized sections.

The major land classes of nonreserved national-forest lands are divided about equally between commercial forest, noncommercial forest, and nonforest lands. Only about 130,000 acres of timberland are considered commercial. The distribution by land classes is rather similar for other ownerships.

TABLE 1 - AREAS BY LAND CLASSES AND OWNERSHIPS <sup>1/</sup>

Ownership	Total Area	Non-forest Land	Forest Land				
			Total	Non-commercial	Commercial		
					Total	Stocked	Nonstock.
				acres			
Nat'l Forest							
Nonreserved	417,268	149,848	267,420	136,787	130,633	129,658	975
Reserved	166,001	121,480	44,521	34,241	10,280	10,280	-
State	665	25	640	150	490	490	-
Other Private	12,287	6,666	5,621	3,245	2,376	2,376	-
TOTAL	596,221	278,019	318,202	174,423	143,779	142,804	975

<sup>1/</sup> For block totals see appendix table 2.

b. General

The commercial forested area is interspersed throughout with areas that are noncommercial and nonforest. The noncommercial forest area is largely prohibitively rocky and very low in site quality. The nonforest is mainly meadowland in creek bottoms, open grassy ridge-tops and barren rocky areas.



A portion is above timberline. The combination of poor site quality and severe climatic conditions has resulted in rather stunted tree growth over a major portion of the working circle.

### c. Forest Types

There are three major timber types within the working circle--lodgepole pine, Douglas-fir, and spruce-alpine fir. Table 2 contains a tabulation of forest types in acres by stand-size classes. Table 3 shows a distribution of age classes by types. Tables 4 and 5 show volume distribution by species, type, and ownership. Volumes shown are by species for the sawtimber portion (trees 11 inches d.b.h. and over) and for all species combined for trees under 11 inches d.b.h. The total board foot volume on national forest is about 553 MM  $\pm$  50 MM (1 SD). In addition there are about 114 M cubic feet of other products. The major types may be characterized as follows:

(1) Lodgepole Pine Type - The working circle contains 60,497 acres of this type. Stocking is primarily in the seedling-sapling and pole sizes with only 4,045 acres of sawtimber. The type occupies poor to very poor sites and only in a few instances forms "dog hair" stands. Approximately two-thirds of the area of this type falls within the 1-60 year age group (see table 3). Stands are mostly even aged.

(2) Douglas-fir Types - There is a total of 44,090 stocked acres of Douglas-fir type which is distributed fairly evenly throughout the various age classes. Sites are generally classed as poor. The sawtimber strata contain 27,610 acres having 287,915 M board feet of sawtimber (11" plus d.b.h.). The poletimber strata, containing 15,230 acres, have an additional 17,656 MBF of sawtimber. Quality is below average in most areas; however, there are a few locations in the Pryor Mountains (West Fork of Rock Creek and Iron Creek) in which high-quality, mature Douglas-fir is found.

(3) Spruce and Subalpine Fir Types - These types occupy 24,986 acres and contain 183,233 M board feet of sawtimber volume. Stocking is rather poor in the younger age classes, but increases in density with age. The 200+ age class is most dense. Sites are mostly classed as poor. Much of the volume occurs in high basins and slopes and will be difficult to log because of rugged topography and rock outcroppings downstream.

TABLE 2 - COMMERCIAL FOREST LAND (NONRESERVED) BY TYPES AND SIZE CLASSES <sup>1/</sup>

## NATIONAL FOREST LANDS

Forest Type	Stand-Size Classes						Percent
	Sawtimber	Pole	Seedlings Saplings	Subtotal Stocked	Non- stocked	Total	
	----- acres -----						
D	27,610	15,230	1,250	44,090	60	44,150	33.8
P	-	85	-	85	-	85	-
LP	4,045	29,810	26,642	60,497	915	61,412	47.0
S	10,930	250	45	11,225	-	11,225	8.6
AF	10,341	2,925	495	13,761	-	13,761	10.6
TOTAL	52,926	48,300	28,432	129,658	975	130,633	100.0
PERCENT	40.5	37.0	21.8	-	.7	100.0	

<sup>1/</sup> For block totals see appendix table 3.TABLE 3 - AGE CLASS DISTRIBUTION BY TYPES OF COMMERCIAL FOREST GROWING STOCK ON NATIONAL-FOREST LANDS <sup>1/</sup>

Age Classes	Forest Types				
	D-P	LP	S	AF	Total
	----- acres -----				
1- 20	1,250	10,642	-	200	12,092
21- 40	690	13,921	45	295	14,951
41- 60	3,776	13,694	-	925	18,395
61- 80	9,136	9,190	250	1,000	19,576
81-100	4,481	8,084	-	1,000	13,565
101-120	3,072	921	364	341	4,698
121-140	1,576	1,000	728	1,000	4,304
141-160	3,783	1,045	728	1,000	6,556
161-180	6,418	1,000	1,444	1,000	9,862
181-200	7,248	1,000	364	1,000	9,612
200+	2,745	-	7,302	6,000	16,047
Subtotal	44,175	60,497	11,225	13,761	129,658
Nonstock	60	915	-	-	975
TOTAL	44,235	61,412	11,225	13,761	130,633

<sup>1/</sup> For distributions by strata see appendix table 18.

TABLE 4 - VOLUMES OF LIVE GROWING STOCK ON NONRESERVED COMMERCIAL  
FOREST LANDS BY TREE-SIZE CLASS, SPECIES, AND OWNERSHIP 1/ 2/

Ownerships	Pole & Sawt. Stands	P	D	S	AF	LP-WLP	Total	Percent
	- - acres - -							
		Sawtimber Volumes by Species for Trees 11" + d.b.h.						
		- - - - - MBF (Scribner) - - - - -						
National Forest	101,226	140	293,914	87,172	51,885	119,747	552,858	99.0
State	285	-	41	-	21	241	303	-
Other Private	1,820	35	2,562	604	1,552	1,653	6,406	1.0
TOTAL	103,331	175	296,517	87,776	53,458	121,641	559,567	100.0
		Cubic Volumes by Species for Trees 5"-11" d.b.h.						
		- - - - - MCF - - - - -						
National Forest	101,226	23	35,800	4,458	14,153	59,196	113,630	98.0
State	285	-	6	2	6	380	394	-
Other Private	1,820	5	499	34	334	1,174	2,046	2.0
TOTAL	103,331	28	36,305	4,494	14,493	60,750	116,070	100.0

1/ For block totals see appendix tables 4 and 6.

2/ The volume on reserved national-forest lands has not been sampled or estimated.

TABLE 5 - VOLUMES OF LIVE SAWTIMBER AND OTHER PRODUCTS ON NONRESERVED COMMERCIAL  
NATIONAL-FOREST LAND BY TYPES AND SPECIES <sup>1/</sup>

Forest Types	Area Sawtimber and Pole Strata	Sawtimber Volumes by Species						Total Other Products
		P	D	S	AF (Scribner)	LP-MLP	Total	
	- - acres - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- MCF -
D	42,840	-	281,963	8,291	4,039	11,278	305,571	44,987
P	85	140	13	-	-	-	153	30
LP	33,855	-	6,148	2,015	4,431	51,307	63,901	48,273
S	11,180	-	5,168	71,943	4,920	39,426	121,457	9,508
AF	13,266	-	622	4,923	38,495	17,736	61,776	10,832
TOTAL	101,226	140	293,914	87,172	51,885	119,747	552,858	113,630
PERCENT			54.1	14.9	9.4	21.6	100.0	

<sup>1/</sup> For block totals, see appendix tables 8 and 10.



#### 4. MANAGEMENT OBJECTIVES

##### a. Community Support

(1) There is practically no forest industry in the working circle. Bridger has a small sawmill cutting timber from the Pryor Mountains. This community has the greatest potential for future forest industry as it is the logical outlet for the Pryor Mountain timber. Red Lodge and Absarokee, with their central locations, would also be logical locations for small forest industries sometime in the future. Presently there is a small mill in Red Lodge which cuts mostly timber from private ownership. Columbus might also support a limited forest industry based on local products sometime in the future since it is on a railroad. At present, laminated arches and beams are manufactured here from west coast Douglas-fir. Douglas-fir is scarce locally and what there is does not meet the needs of local industry.

(2) Logging camps may be necessary in parts of the working circle due to distance from towns. This is particularly true in the Pryor Mountains.

##### b. Silviculture Objectives

(1) To secure reproduction promptly after harvesting mature timber.

(2) Grow the maximum amounts of sawtimber, posts, and poles to supply local market.

(3) To obtain full stocking and maximum yield possible from the available sites.

(4) To produce trees of good quality and form.

(5) To obtain the most rapid growth compatible with a full stand and good quality.

#### 5. COORDINATION WITH OTHER USES

##### Objectives:

Timber management practices will be closely correlated with other resource use as provided in FSH 2413.1. Multiple use is a guiding principle of the Forest Service. It will be used as a basis for correlating timber production with other resources of the working circle. The following guidelines should be followed to accomplish this end:

##### a. Water and Soil

Water is the most important resource produced in the Beartooth Working Circle. Water is truly the life blood of the farms and ranches below the working circle all the way to the Yellowstone River. More than 81,000 acres of irrigated land along the Stillwater River and Rock Creek

and their tributaries are dependent upon this water. Water from the Pryor Mountains irrigates about 2,000 acres, bringing the total area irrigated from waters of the working circle to 83,000 acres with an additional 19,000 acres of potential.

Most of the electricity used in the working circle is generated from water power by the Mystic Lake power plant located on the forest. The municipal water supply for the city of Red Lodge also comes from the West Fork of Rock Creek which is within the working circle.

The Forest Service thus has a recognized responsibility to practice the highest type of watershed management. What happens upstream may affect the economy of many farm and ranch units and the city of Red Lodge. Tied directly to watershed management is management of the soils of the area. The soils of the working circle are predominantly granitic and erosive. This factor, plus the extremely steep topography over the majority of the area, compounds the problems of watershed management.

Stream courses in the natural drainage system must be maintained in good condition to permit orderly runoff. Downstream channels and irrigation systems cannot operate effectively unless the headwater streams are in a stable, healthy condition.

Cutting in small patches is deemed the best practice to increase snow storage in all timber types as compared to that experienced in cutting larger blocks. The uncut patches will reduce movement of the wind and should decrease evaporation in the small openings. Shade caused by the uncut timber will also tend to prolong the period of snowmelt. Damage from erosion will be reduced by frequently breaking up the continuity of cutting units in steep mountain terrain.

The following policies will be followed:

- (1) Streamside trees which must be cut shall be felled away from stream when possible.
- (2) Tractors and other equipment will be kept out of channels and away from the banks.
- (3) Logging and road building debris will be kept out of stream channels and out of reach of high water.
- (4) A margin of safety will be provided in size of culverts and bridges to permit peak flows of water and debris from logging areas.
- (5) Road construction must not restrict channels or put loose material into intermittent streams since it is likely to divert channels or be carried away by running water.
- (6) Accepted measures for preventing erosion on roads, skid trails, and landings will be followed and will be made a part of timber sale contracts.

(7) Watershed considerations will dictate cutting and logging methods on steep slopes or poor sites.

(8) Stream channel changes will be kept to a minimum.

(9) Cutting and logging practices will be designed to maintain the highest possible quantity and quality of water.

b. Recreation

The area included in the working circle has a great and varied recreation potential. Considering the nearness of a large population center such as Billings, the recreation resource becomes extremely important. Some of the attractions of the area are listed in the following paragraphs:

Red Lodge-Cooke City Highway - This oiled state highway climbs from the Rock Creek Canyon at an elevation of 6,000 feet to the top of the Beartooth Mountains, elevation 11,500 feet, and traverses very spectacular country. The view from almost any spot on the highway is striking, with many alpine lakes and mountain peaks easily visible. The highway serves also as an entrance route to Yellowstone National Park.

Beartooth Primitive Area - Accessible only by trail, this area comprises 166,000 acres and contains many alpine lakes and several mountain peaks over 12,000 feet in elevation. Granite Peak, the highest mountain in Montana, is located in this area.

Rock Creek Canyon - This canyon bottom has been devoted almost entirely to recreation use. It contains a variety of campgrounds, resorts, picnic areas, organizational group areas, and summer home colonies.

Grizzly Peak Winter Sports Area - First opened in 1959, this area has become a very popular winter sports area.

Pryor Mountains - This undeveloped area has a high recreation potential. Numerous ice caves and the spectacular Crooked Creek Canyon, with its 400-500 feet vertical walls, furnish unique recreational attractions.

Total recreational visits in the working circle during 1960 were 429,000.

Particular care will be exercised in the planning and conducting of logging operations to protect recreational values. The policy established by the Chief of the Forest Service for logging in and adjacent to recreation areas will be followed in all logging plans. (FSH 2413.22).



### c. Grazing

Most of the Pryor Mountain area is grazed. Grazing in the Beartooth Mountains is generally confined to stringers of grass along streams, meadows, and rolling foothill country near the forest boundary. Presently 3,400 cattle and 6 bands of sheep graze this working circle. The objective of grazing management on primary range is to provide adequate soil cover under proper livestock use. The browsing of tree reproduction will be tolerated on primary ranges, but will be insignificant under proper use.

Browsing detrimental to timber production will not be allowed on secondary ranges.

No artificial means will be used to increase the acreage of forest land at the expense of primary range areas.

There are many grazing problems in the working circle but very little conflict with timber production.

### d. Wildlife

Coordination of timber use with wildlife will be in accordance with that prescribed in FSH 2632.1 and FSH 2413.24.

There is an overabundance of deer on all winter ranges throughout the working circle. Damage to Douglas-fir reproduction occurs. In general, key deer winter range areas do not coincide with the commercial timber areas. The management goal calls for balancing deer numbers with optimum production of feed on winter range areas. Moose are overabundant in certain areas and have depleted their winter and summer ranges. The only noticeable damage to timber is heavy browsing of subalpine fir.

To reduce the deer herd in some overstocked areas, liberal hunting seasons have been established. Seasons on most of the working circle call for two deer (either sex) and in some cases special additional seasons. The number of moose permits has increased materially in recent years.

Fishing is very important in the working circle and particularly in the Beartooth Mountains. Special cutting methods will be used along fishing streams and lakes to maintain desirable water temperatures by providing shade, stabilization for streambanks, and act as a filter for surface runoff.

Timber harvesting will help wildlife management by making openings in the forest stand, thereby providing food and adjoining cover for game. The road construction program associated with increased timber utilization will provide accessibility for hunters and fishermen. Since adequate harvest of the wildlife crop is essential to good game management, these additional roads will increase the harvest and value of the wildlife crop.

e. Mining

Mining activity in the Beartooths is generally confined to the Stillwater Basin, mouth of the Stillwater Canyon and Hellroaring-Line Creek plateaus. These areas do not pose problems in timber management. The Pryor Mountains are covered with claims and there is some active uranium mining. Conflicts may occur here. Surface rights determination is now underway in the Beartooth Mountain portion of the working circle.

6. REGULATION

a. Rotations

Rotations are set to agree with the culmination of mean annual growth in board feet for each type except lodgepole pine. The rotation for lodgepole pine is set to agree with the culmination of mean annual growth in cubic feet for trees 5 inches d.b.h. and over.

Rotations recommended for each of the forest types and used in the calculations of growth and allowable cut are as follows:

<u>Forest Type</u>	<u>Rotation in Years</u>
Douglas-fir, ponderosa pine	160
Spruce, Subalpine fir	140
Lodgepole pine	120

Rotations recommended apply to average site conditions. Individual stands growing on poorer or better sites than average will require more or less time to mature. Many of the existing stands now exceed the recommended rotation age, or will before they are cut, because of lack of access roads. The backlog of older-age classes is such that 60 or 70 years of cutting will be required in overmature material to reduce the cutting age to near that recommended in the plan (appendix table 22 - Tabular Check).

b. Cutting Cycle

The only cutting cycles observed will be those to improve growing conditions in immature stands and to preserve protective cover on severe sites. Intervals between such cuttings will coincide as nearly as possible with best growth response. This, for most types, is believed to be about 20 years. On severe sites, cuttings will be further timed to take advantage of seed years.

Cuttings in young stands generally will not start until volumes to be removed are of commercial importance. This usually will not occur until stands reach about one-half the rotation age. Cuttings before that time will depend upon unusually good market conditions for small products, or the availability of appropriated funds to do cultural work. Satisfactory stocking conditions will be maintained throughout all periods of intermediate cuttings.

### c. Growth and Mortality

It is important to obtain the maximum amount of growth from the existing growing stock and site potentials. Only by doing so can the full productivity of a unit be obtained. Little can be done to change site conditions at this time. Much can be done to improve the growing stock (see Growing Stock Objectives).

The measure of growth will influence the allowable annual cut and the economy of the working circle to a marked degree. Growth and mortality data for this working circle were secured from inventory plots taken in 1960. This information yielded net periodic annual growth rates of 4.2 MM board feet of sawtimber and 18 M cords of other products during the period 1951-1960 inclusive (table 6). This is at the rate of 41 board feet per acre per year, plus about .2 cords of other products, which is low compared to productive capacities.

**TABLE 6 - PRESENT AND POTENTIAL GROWTH OF SAWTIMBER AND OTHER PRODUCTS  
NATIONAL FOREST**

Growth and Mortality	Sawtimber		Other Products		
	/acre/yr.	Total	/acre/yr.	Total	
	BF	MBF	CF	MCF	M cds.
<u>Periodic Annual Growth (Net)</u> <sup>1/</sup>	41 <sup>2/</sup>	4,167	16	1,610	18 <sup>5/</sup>
<u>Mortality</u> <sup>1/</sup>	15 <sup>2/</sup>	1,546	-	-	-
<u>Actual MAG</u>	58	7,620	6	770	9
<u>Sustained Yield Capacity</u> <sup>3/</sup>	118 <sup>4/</sup>	15,429	15	2,011	22
<u>Realizable (70% normal)</u>	82	10,798	11	1,401	16

<sup>1/</sup> From inventory data taken in 1959-1960.

<sup>2/</sup> Rates for sawtimber and pole strata only of 101,226 acres.

<sup>3/</sup> From "Tables of Yield and Mean Annual Increment of Fully Stocked Stands in Major Forest Types in Region One." U.S. Forest Service, Missoula, Mont.

<sup>4/</sup> Prorated against total commercial forest area of 130,633 acres.

<sup>5/</sup> 90 cubic feet = 1 cord.

One of the main reasons for the low growth during the past decade is the high rate of mortality. Mortality has been running nearly one-third of the gross growth of sawtimber. The bulk of this loss has occurred in mature sawtimber stands where a heavy toll has been and is being taken by comandra blister rust and dwarfmistletoe. There is little likelihood that the heavy losses in volume can be reduced in the immediate future without providing greater accessibility within the working circle and the application of more intensive forestry. Neither appears imminent at this time.



Growth potentialities in the working circle are low, much below the regional average, especially for Douglas-fir and spruce. Rates of growth can never be high under the circumstances; however, the present rate can be doubled or tripled under more intensive management and thus ultimately allow a higher annual allowable cut (appendix table 17).

#### d. Cutting Methods

Cutting methods for the various forest types will be in accord with regional marking guides (FSH 2442.8) unless otherwise specified. Methods called for by the guides will be correlated with other important land uses and adjusted, when necessary, to accommodate those uses. They will be supplemented by specific marking instructions for each timber sale area. A revision of the guides is in process to more fully cover intermediate cuttings.

#### e. Allowable Cut

Several regulatory methods were considered and used in setting the allowable cut for the working circle. These were the Kemp, Von Mantel, Hanzlik, and Austrian formulae and the Tabular Check method (table 7 and appendix table 22). The several methods exhibited rather close agreement in annual allowable cuts except for Hanzlik which was high. Eliminating Hanzlik, the other four methods averaged 8.8 MM board feet of sawtimber annually.

TABLE 7 - INDICATED ANNUAL ALLOWABLE CUT OF SAWTIMBER AND OTHER PRODUCTS  
NATIONAL FOREST LANDS

#### REGULATORY METHODS

Regulatory Method	Annual Cutting Area Acres	Volumes for All Types and Species		
		Sawtimber MMBF	Other Products MCF	M cords
Kemp	966	9,060	1,240	13.7
Von Mantel	-	8,620	1,429	15.8
Hanzlik	-	10,927	1,064	11.8
Austrian	-	9,117	-	-
Tabular Check	845	8,500	-	-
Area Regulation	950			

The Tabular Check method, which is a test of applicability of a proposed cut against an anticipated amount of growth and growing stock, showed that the most appropriate cut would be between 8.5 to 9.0 MM board feet of sawtimber from approximately 850 to 900 acres annually. Such levels of cutting would gradually reduce the excess growing stock and the cutting age and ultimately produce the desired rotations.

Regulation, however, will apply primarily to areas. Area regulation methods vary from 845 acres to 966 acres of clear cutting in mature sawtimber. Eight hundred fifty acres, or that shown by the Tabular Check method, is believed to be the most accurate. In addition, an additional 250 acres of lodgepole pine should be clear cut for other products only, or a total of 1,100 acres. Strict area regulation would require cutting only 950 acres annually.

Regulation of cut should be applied by types insofar as possible. Annual allowable cuts by types are shown in table 8. The approximate breakdown by species appears at the bottom of the table. There should be less concern about reaching the indicated distribution of cut by species than about reaching the recommended cuts in area and volume by types. Even so, some attention should be given to it. It is not good management to permit the depletion of certain species (especially the most valuable or accessible ones) and not push the harvest of others.

The regulated volume of other products, indicated in table 8 as 13 M cords, pertains to the removal of material below sawtimber size and quality. Utilization of this material generally is urgent since it helps to prepare cutover areas for regeneration. Harvest of other products will be a timber sale requirement whenever utilization has proven economically feasible elsewhere. The aforementioned cuts do not consider volumes that might be harvested as intermediate cuttings. Few such cuttings have been made to date in this working circle; however, there are indications that markets for small-size products will develop soon and sales can be made for this class of material. It is desirable, therefore, to establish harvest objectives from immature stands at this time. Appendix table 23 shows areas of dense young stands that should be given intermediate cuttings of one kind or another annually--also volumes that may be removed in such cuttings. Areas to be cutover should be stressed rather than volumes to be obtained since this is primarily a measure to stimulate growth.

The volumes obtained in intermediate cuttings are in addition to those which are removed in reproduction or harvest cuttings. No reduction in volume of final harvest cuttings is anticipated as a result of the intermediate cuts.

For the present, calculated allowable cuts in young stands should be considered cutting objectives rather than maximum allowances. A number of years probably will have to elapse before the full cut can be marketed. Under occasional ideal market conditions, it might be well to greatly exceed the indicated cut in order to secure stand betterment conditions more rapidly.

Accessibility, operating, and marketing conditions may not permit cutting at the precise rates specified in table 8. To allow for the usual contingencies, rates specified may be exceeded by as much as 25 percent in one year provided the total for the plan period is within 10 percent of the area and volume objectives. Undercuts may be accumulated within the plan period, but liquidation of any accumulations will be subject to the 25 percent overcut limitation.



TABLE 8 - ANNUAL ALLOWABLE CUT BY TYPES AND BLOCKS  
NATIONAL FOREST LAND

Kind of Cutting	Annual Cutting Area by Forest Type					Annual Cut by Types					Other Products
	D-P	LP	S	AF	Total	D-P	LP	S	AF	Total	
	-	-	-	-	-	-	-	-	-	-	M cords
	-	-	-	-	-	-	-	-	-	-	-
Final Harvest	80	250	120	50	500	800	1,200	1,500	500	4,000	5.0
Intermediate	150	500	-	-	650	100	125	-	25	250	3.0
-	-	-	-	-	-	-	-	-	-	-	-
Final Harvest	320	180	-	100	600	3,700	700	-	600	5,000	8.0
Intermediate	550	300	-	100	950	300	50	-	-	350	4.0
-	-	-	-	-	-	-	-	-	-	-	-
Final Harvest	400	430	120	150	1,100	4,500	1,900	1,500	1,100	9,000	13.0
Intermediate	700	800	-	100	1,600	400	175	-	25	600	7.0

1/ 250 acres of this is on very poor sites and productive of cordwood only.

TABLE 8b - APPROXIMATE ANNUAL ALLOWABLE CUT OF SAWTIMBER BY SPECIES FROM HARVEST CUTTINGS

Block	Species					Other Products
	D-F	LPP	S	AF	Total	
Stillwater	1.4	1.3	.9	.4	4.0	M cords
Rock Creek	3.6	.7	.1	.6	5.0	5.0
Working Circle	5.0	2.0	1.0	1.0	9.0	8.0
						13.0

An allowable cut of salvage products has not been determined, nor is regulation of these products planned. The perishable nature of this material makes it desirable to harvest it in unlimited quantities as rapidly as possible. Quantities available are shown in appendix table 21.

It is important to charge the volume cut against the right allowable cut category. Volumes secured from harvest cuttings cannot be charged against the intermediate cutting allowance nor vice versa. Neither can the size of material be ignored. Should any substantial amounts of sound sawtimber (over 11" d.b.h.) be harvested as poles, posts, pulpwood, etc., such volumes must be charged against the sawtimber allowable cut.

Cutting control applies to the working circle rather than to blocks or ranger districts. Since administrative control is by districts, apportionment of the total allowable cut is, and will be, by districts according to the prevailing timber management needs within the working circle. (See table 8b) Such apportionments are subject to periodic adjustments by the forest supervisor during the effective life of the plan.

The sustained cuts on other ownerships are not very significant. It is estimated to be about one million board feet of sawtimber and about 1,500 cords of other products annually. Nearly all of it would come from private lands.

#### f. Cutting Budget

The cutting budget is contained in the Current Action 5-Year Plan for the working circle (appendix table 24) which indicates areas and volumes planned for sale. An appendix map also shows planned cutting areas in relation to access road needs.

The plan will be revised annually to (1) keep it current, (2) maintain the allowable cut, and (3) obtain the desired silvicultural objectives. The sales program is presented annually by mail to prospective purchasers and other interested parties. The annual sales program is coordinated with this five-year plan.

### 7. SALES POLICY

Sell full allowable cut of all species insofar as markets and finances for sale preparation, administration, and road construction will permit.

Each sale will be authorized only after practical fire prevention measures and methods of cutting and logging are prescribed which will (1) preserve residual growing stock, (2) promote reproduction, (3) maintain favorable waterflow, and (4) obtain as complete utilization of the timber as existing markets will permit.

#### a. Size of Sales

Sale size will be determined by needs of potential purchasers and the cost of developing an adequate transportation system. Sawtimber sales generally will be under 500 M board feet although a few may have to be for as much as 5 or 6 MM board feet to permit adequate developments to be installed. Sales duration will seldom exceed two years.

There is a steady demand for small sales to ranchers and others primarily for poles and posts. These demands can generally be met by stand improvement cuttings in young timber and salvage cuttings on logged-over areas.

#### b. Merchantability Specifications

Utilization limits on this working circle generally are to smaller sizes than for the region as a whole. As a minimum, merchantability specifications listed in FSH 2432.23 will be followed.

#### c. Logging Methods

Tractor skidding and truck hauling will be the usual methods of logging. Skid trails will be on gradients that will not produce excessive erosion. Skid trails will not be permitted in live or intermittent streambeds. Streambanks will be protected. Timber will not be felled or dragged across streams or streambeds as a general practice. Logging debris which collects in streams at road crossings shall be removed. Soil erosion prevention requirements will be included in sale contracts. Often, particularly in the Beartooths, very stringent soil erosion requirements will be necessary.

As timber values and demand increase, perhaps skyline cable logging methods will prove feasible on steep granitic soils. Under present economic conditions, much of the timber on these steep erosive soils is inoperable.

### 8. FOREST DEVELOPMENT

#### a. Transportation

(1) Present System - There are no compartments within the working circle that have adequate transportation networks. Often a higher standard road is required by a combination of other uses than would be needed to harvest the timber itself.

The working circle has only one main highway, the Cooke City road, cutting through one corner of the Beartooths. There is a good net of oiled state and county secondary roads below the Beartooth Mountains running from Nye City to Absarokee, Absarokee through Roscoe to Red Lodge, up the West Rosebud River to the Fidler Creek road, and from Red Lodge through Belfry to Bridger.



The Pryor Mountains are served only by ungravelled county roads and car trails. Federal Highway No. 310 running west of the mountains from Bridger to Lovell is the nearest improved road.

Railroads are few. Red Lodge is on a branch line of the Northern Pacific Railway from Laurel. The Burlington Line parallels Highway No. 310 with sidings at Bridger and Warren. The main line of the Northern Pacific Railway follows the Yellowstone Valley 50 miles north of the Beartooths.

(2) Needs - The road system within the working circle is poor. Many existing roads are primitive or only slightly improved. The following figures are taken from the transportation plan approved in 1958. There are 62.8 miles of satisfactorily constructed roads; 73.8 miles unsatisfactory; and 57.4 miles nonexistent for a total of 194 miles. Additional road systems planned are 244.3 miles. Total miles of system roads in the working circle are 438.3.

(a) Priorities - The road needs for the next three years are shown in the appendix by priorities on form R1-2410-8 which is a part of the correlated working circle analyses. (Append. table 27)

(b) Policy - Timber access roads that are difficult to construct or that have high cost relative to the amount of timber to be hauled in the near future will be programed for construction with Federal funds. Timber utilization roads will be programed for construction by an orderly disposal of timber. All roads will be constructed according to design standards approved for the region and as called for in the forest transportation plan. Transportation planning indicates that many roads will need a higher standard for national forest traffic than required for timber sale needs. In these cases the roads may be constructed entirely from appropriated funds or on a cooperative basis from appropriated funds used to supplement timber purchaser construction.

(c) Programs - Timber harvesting hinges directly upon an adequate road construction program. The transportation plan revised in 1958 is the basis for this program. The program should be revised annually in accord with Forest Service Manual instructions.

The projects which should be given priority in this working circle for construction from Federal funds are as follows:

<u>Name of Road</u>	<u>Road No.</u>	<u>Mileage</u>	<u>Estimated Cost</u>
1. Stevens Draw	3085	5.0	\$ 20,000.00
2. Crooked Creek	73	3.5	35,000.00
3. West Fork-Stillwater River	846.3	15.2	475,000.00

b. Planting

(1) Needs - Natural regeneration has provided adequate stocking on most sites. Some planting may be necessary where fires have destroyed a stand and seed source, or where it is needed for erosion control.

(2) Policy - Planting will be done according to the Forest Service Manual and Planting Handbook standards applicable to "East Side" forests. However, the opportunity to plant is limited except on poor sites (see appendix table 19).

Timber sale areas will be planted when natural stocking cannot be expected within three years after cutting or where it is necessary to improve stand composition. K-V funds will be collected and used for such work.

(3) Program - As needs develop, a current cumulative record of plantable acreage will be developed and maintained. This will be revised yearly.

c. Timber Stand Improvement

(1) Needs

(a) Thinning in pole stands and release of crop trees.

(b) Weeding in seedling and sapling stands.

(c) Control of dwarfmistletoe, comandra rust, and gall rust.

(2) Policy - Timber stand improvement plans will be a standard part of timber sale preparation. The regional Stand Improvement Handbook will serve as a planning guide.

(3) Program - The objective in management should be to increase productivity of the forest land, to increase the quality and value of the products and to increase the allowable cut. One major means of accomplishing this objective is to apply stand improvement measures to immature stands. As funds are presently unavailable for this work, the plan is to thin pole stands where there is a market for posts and poles, marking those trees that should be removed. The major stand improvement measure under present conditions will be removal of dwarfmistletoe-infected overstories.

d. Disease Control

(1) Problem

(a) Dwarfmistletoe is found throughout the lodgepole pine type and is also present in limber pine within the working circle. Lodgepole stands, particularly in the Benbo, Fishtail Creek, and

West Fork of Rock Creek. Areas have been severely stunted by dwarfmistletoe attacks. This parasite reduces growth and causes a marked increase in mortality of merchantable stands. The disease is serious and widespread in this working circle.

(b) Rust Fungus Diseases - The limber pine, in many areas of the working circle, is heavily diseased with white pine blister rust. Comandra rust in lodgepole pine is quite widespread and some experimental spraying for control was done in the main fork of Rock Creek during 1961. Western gall rust and stalactiforme rust are also present and may prove to be a serious threat.

(c) Wood Fungus Diseases - Red rot is common in overmature lodgepole pine stands. Other rot producing fungi are present, causing losses in Douglas-fir stands.

## (2) Policy

(a) Dwarfmistletoe - Maintain closed crown, even age, fully-stocked stands to be harvested at rotation age to minimize losses. No overstory of infected trees will be left after cutting.

The general policy in stands where the understory is established and is severely infected with dwarfmistletoe will be to eliminate advance reproduction and start a new crop. Methods of control will be applied to cutover areas as a K-V practice.

(b) Rust Fungus Diseases - Timber stands in key areas will be sprayed on a trial basis with antibiotics. Effort will also be made to reduce spread of these diseases through methods of cutting and use of K-V programs.

(c) Wood Fungus Diseases - Stands will be cut on rotations sufficiently short so decay losses in second growth stands will be of minor consequence.

## (3) Program

(a) Dwarfmistletoe - Clear cutting is the principle means of control. Clear-cut blocks will be of such size, shape, and location as to minimize the spread of the infection from the perimeter; however, proper consideration will be given regarding the size of blocks so that natural reseeding is favored. K-V funds will be used to destroy infected advance reproduction and infected cull trees left in clear-cut blocks.

(b) Wood fungus diseases, likewise, will be controlled by removal of diseased trees through cutting operations and stand improvement measures. Keeping fires out of timber will prevent scars and an entrance for wood destroying fungi.



e. Insect Control

(1) Problem - Some mortality in the overmature spruce stands is being caused by the spruce bark beetle. Conditions favoring a buildup of these beetles could quite easily lead to an epidemic. Much of the infestation now present is within the Beartooth Primitive Area.

The mountain pine beetle is at present endemic but may become a problem in the older lodgepole pine stands at any time.

Increasing evidence of mortality caused by the Douglas-fir bark beetle is visible in the Pryor Mountain area. This is spotty and can still be considered endemic.

The spruce budworm currently is not serious but judging by its ravages in adjacent working circles is likely to become so.

(2) Policy - Blowdown, bug-infested and fire-weakened timber will be harvested as rapidly as possible. Overmature and high-risk trees will be scheduled for harvest as rapidly as circumstances permit. These measures will discourage a buildup of bark beetles.

(3) Program - Vigilance will be maintained to observe and report any increased activity by insects.

Where major outbreaks are evident, control programs will be planned and carried out in keeping with research findings and available funds.

f. Animal Control

(1) Problem

(a) Porcupine - Damage is heavy by porcupines in some parts of the working circle. The lodgepole pine areas are hardest hit. Damage is serious in some mature lodgepole stands.

(b) Livestock and Game - Heavy overuse is evident on some livestock ranges, but little damage to reproduction is attributed to livestock use.

There is a heavy overpopulation of deer but damage to reproduction is generally minor. Some Douglas-fir reproduction has been browsed.

(2) Policy

(a) Porcupine - Survey and control programs will be initiated in cooperation with U.S. Fish & Wildlife Service when it appears necessary.

(b) Livestock & Game - When it becomes evident livestock are damaging timber on secondary range, adjustments to prevent such damage will be made. This will be done under existing provisions and policies for proper use of the range resource. Damage on primary ranges, which are usually outside commercial timber growing areas, will be tolerated when proper use of range is achieved.

Game damage, when it occurs, will be controlled by hunting regulations worked out in cooperation with State Fish and Game Department.

(3) Program

(a) Porcupine control will be effected on formal projects through cooperation with the Fish and Wildlife Service. Killing of porcupines by forest users and forest employees will be encouraged. Shooting during the winter months is most effective. Also, feasibility of introducing the fisher as a natural predator will be explored.

(b) Forest officers will maintain vigilance to detect and report instances of animal damage and to take such control measures as indicated under policies stated above.

g. Fire Control

This working circle has a low fire incident. The generally north-facing area, extremely high elevations, and low number of violent lightning storms all help. Very serious fires occasionally do occur, however, such as the two man-caused fires in September 1948 in Rock Creek Canyon. The ruggedness of the area and lack of access present a serious problem in getting to the fires before they become large. An increasingly serious risk is the recreationist, as visitors multiply in this heavily used area. The highest risk months are July, August, and early September.

(1) Annual Losses - Analysis of the fire history for the period from 1951 through 1960 shows a total of 30 man-caused fires (43 percent) and 39 lightning-caused fires (57 percent) for a total of 69. Total acres burned was 61.8 or an average of 6.2 acres per year. The average burned area per fire was .9 acres. There is a need to intensify the education of people, particularly recreationists, in the need for fire prevention.

The allowable annual fire loss for the Custer National Forest is .29 percent of the area protected. The actual annual loss for the past 10 years has been 0.00009 percent of the gross area of the working circle. This indicates a very satisfactory fire record for the last ten years.



(2) Slash Disposal - The objective will be to reduce slash to an M-M classification. In the past, slash disposal work consisted mainly of hand piling and burning major concentrations of debris on timber sales. Future timber sales will include more clear cutting and some dozer piling with subsequent burning. Under certain conditions, prescribed burning will be employed. These disposal methods will prove more economical than hand piling. There are now no bodies of undisposed slash present which create an unusual fire threat on the working circle.

Small product sales of poles and posts have required slash to be lopped and scattered by the purchaser. This practice is satisfactory and will be continued in the future. On larger sales it will be the policy to have the purchaser do all needed slash disposal work except burning. Burning will be done by the Forest Service using funds collected from the purchaser for this purpose. Timber sale contracts will contain clauses specifying fire protection requirements which conform with regional standards and state fire laws.

#### h. Acquisition

No land exchanges are contemplated at this time; however, rights-of-way must be obtained before logging can begin on many of the timber stands. Right-of-way acquisition will be geared to the three-year road building program set forth in the annual "Correlated Working Circle Analysis." Work to secure the necessary rights-of-way will be begun at least three years in advance of the actual need for beginning of construction.

Right-of-way needs for the cutting program of the next five years appear in appendix table 27.

### 9. COOPERATION

#### a. With Other Federal Agencies

Coordinate timber activities if the need arises, with timber sale activities on the adjoining Indian Reservation timberlands.

Cooperation to date has been principally in the field of fire protection and with the Soil Conservation Service in watershed management problems. A program has been worked out with the Agricultural Stabilization and Conservation Committee on A.C.P. as they relate to timber management.

#### b. With State Agencies

Work closely with Montana Fish and Game Department in the management of game and game habitat. Work with State Forestry Department to help promote sound management on all state and private timberlands within or adjacent to the working circle.

c. With Private Owners

(1) Cooperate with local sportsmen's organizations on fish and game management.

(2) Cooperate with recreational organizations.

(3) Cooperate with local organizations and interested citizens on access road programs, and in creating and sustaining local industry.

(4) Acquaint interested parties with Forest Service plans, practices, and policies.

## E. SUPPORTING DATA

### 1. HISTORY

Captain Clark of the Lewis and Clark expedition traveled north of this area down the Yellowstone River in 1806. In 1868 this entire region from the Yellowstone River to the Wyoming Line was made a part of the Crow Indian Reservation. In 1870 gold was discovered at Cooke City. During the years 1885-1890, Nye City flourished as a mining camp--mostly tents. The yellow pine and cottonwood timber in the foothills and along the Yellowstone was cut over during the latter part of the nineteenth century.

During the period 1870 to 1904, a total of 138,000 acres of timberland burned in this general area. Most of this burned area occurred within this working circle in the Beartooth Mountains along the lower portion of the canyon and the mountain front. Man was the chief cause. During the 1890's a large fire burned the mountain front near Red Lodge. At this same time the mountain front from the Stillwater River to Little Rocky Creek also burned.

The year 1887 was the turning point for use of timber from this working circle. The coal mines at Red Lodge were opened that year. Coal mining became big business at Red Lodge in 1889 when the railroad arrived. By 1898 a railroad reached Bear Creek and by 1902 reached the Washoe mines. The mines demanded large amounts of timber for mine props. Material came largely from the old burns along the mountain front, the West Fork of Rock Creek and main fork. Considerable timber was also used for fencing and fuel by ranchers and for cordwood in lime burners. As early as 1890 small sawmills were producing lumber for local use in the Red Lodge area.

The period between 1899-1916 saw timber drives on main Rock Creek. The timber came from the steep slopes of the canyon, was skidded tree length by hand down steep "ground chutes," then skidded by horses to the edge of the stream. The logs were decked for the spring drive to Red Lodge. Decks of logs and remains of log jetties are still to be found. During portions of this period an interesting brush disposal method was required. The areas were practically clear cut and the brush was piled in continuous parallel piles stretching vertically up and down the mountain slopes. This brush was not burned except accidentally. These ribbons of brush are visible today particularly in the Silver Run drainage. Large scale coal mining at Red Lodge ended in the early 1930's. The Washoe mines closed in 1935 and Bear Creek was through in 1943. Thus ended the relatively heavy cutting in this working circle.

On September 4, 1902, the Absarokee Forest Reserve was established. This included all of the Beartooth Division. The Beartooth National Forest, which included the Pryor Mountains, was established in 1908.

From 1890 to the present time some timber for lumber, house logs, fence posts, and poles was produced in addition to the mine timbers, but it represented a minor portion of the whole. These products were for local use. Picket Pin Canyon has an intermittent history of small sawmill production of lumber for local use. During World War II this canyon produced materials for the Mouat and Benbo chrome mines.



Little is known of the early timber cutting in the Pryor Mountains except for the fact that some tie cutting occurred during the early 1900's for the Pryor Gap Railroad. Local ranchers have used small amounts of timber products through the years.

## 2. PHYSIOGRAPHY

### a. Topography

There are two mountain ranges within the working circle--the Beartooths and Pryors.

The Beartooths consist of a high uplift of metamorphic rocks, mostly gneissic. There are sedimentary rocks along the north and east edges of the mountains--mostly limestone. A northward moving glacier cut a series of cliff-bound U-shaped gorges thousands of feet deep. This produced some very rugged and grand scenery. A high plateau-like area remains between some of the canyons, pitted with numerous depressions and intersected by ridges and shallow ravines. Elevations vary from 5,000 to 12,850 feet at Granite Peak, the highest point in Montana. The plateau areas average 10,000 feet. The Beartooths drain into the Yellowstone River system. The principal watersheds are: Rock Creek, East Rosebud, West Rosebud, and Stillwater Rivers. The best timber is located along canyon bottoms and on north slopes in lower, more gently sloping mountain front areas. The elevation range of commercial timber is from 5,500 to 7,500 feet.

The Pryors rise uniformly at a moderate rate from southwest to northeast and then break off abruptly on north and east forming limestone cliffs. A series of box canyons carved through the limestone formations traverse the eastern portion of the area. Sage and Crooked Creeks, tributaries to the Big Horn River, are the principal watersheds. Elevations vary from 5,000 to 8,875 feet. The best timber is found on north and east slopes at elevations of 6,200 and 7,500 feet.

### b. Soils

The soils in the Beartooths are residuals from parent gneissic rocks and are very shallow. Soils when undisturbed are well drained. When disturbed they are very erosive. Considerable care must be exercised in locating roads to keep grades moderate and the road well drained. Preventive measures must be taken on logging operations to prevent soil loss.

Soils in the Pryors range from clay loams to very sandy. The southern portion of these mountains consists of unstable sandy and clay soils. The principal timber producing soils are derived from limestone and are quite stable and fertile.

### c. Climate

The climate of the Beartooth Mountains varies from moderately severe in foothills to very severe in high plateau areas. Strong down canyon winds are the rule during the winter and early spring period. The growing

season is very short with frost possible every month. Heavy wet snows often occur during the spring period. Winters are often mild with little snow to disrupt logging in lower elevations.

Precipitation at Nye (elevation 4,845 feet) averages 21.55 inches with 13.10 inches falling during the May to September period. Mystic Lake power plant at 6,545 feet shows average precipitation of 24.63 inches with 11.92 inches falling during the May to September period. Red Lodge at 5,600 feet averages 24 inches of precipitation.

The Pryor Mountains climate varies from the very dry 9-inch precipitation at Bridger to heavy snows above 6,000 feet. The Douglas-fir belt averages 14 to 16 inches precipitation per year.

### 3. ECONOMY

Agriculture, in the form of livestock ranching and diversified farms, is the principle industry of the working circle. The trading centers for agriculture and their populations are Columbus 1,100, Red Lodge 2,700, Bridger 850, and Absarokee 600. Recreation is an important and growing business centered in the Red Lodge area. Chrome mining at Nye employs 200 but is expected to close the fall of 1961 when the government contract runs out. A small coal mining industry hangs on at Bear Creek.

The lumber industry is very minor. One small sawmill (3-5 M per day) is harvesting timber from forest land in the Pryor Mountains. A very small mill at Red Lodge cuts timber off private land. Poles and posts are harvested primarily for local ranch use. The Timberweld Company at Columbus builds laminated timber beams from west coast Douglas-fir.

### 4. WORKING THE PLAN

#### a. Annual Plans

To make the plan effective, annual action plans in extra detail must be prepared. Most important among these is the Five-Year Coordinated Timber Harvest and Access Road Plan or Current Action Plan for the working circle as it is sometimes called. This five-year plan, which is revised annually, assures that access roads will be planned and ready for construction in advance of the need for timber harvest. The plan also serves as a guide in preparing cruising and timber sale preparation schedules and is the basis upon which operating funds are received.

Also important are such plans as the Annual and Four-Year Planting Plan and the Current Determination of Plantable Acres. Other annual plans may be necessary in the event of disease and insect infestation or serious fires.

b. Control Records

Systematic records will be kept concerning such things as areas cut over, volumes of various products removed, burned areas, and areas planted. Among these control records are the following:

(1) Record of Sale of Forest Products - This tabulation will consist of name of purchaser, date of sale, volume and kind of product, stumpage price by species, compartment number, and location by legal description.

(2) Current and Cumulative Volume and Area Control Record - This record will serve as a comparison of cumulative actual cut with budgeted cut. It will be compiled on especially prepared forms (R1-2440-16 and R1-2440-17) annually in August.

(3) Cutover Area Record - This will be primarily a map upon which areas cut over for saw logs are posted. Such posted areas will be keyed by means of numbers, and if necessary color codes, to the record of sale of forest products by fiscal year.

(4) Planting Record - This will consist of a map showing the location of plantations and a data sheet giving such information as plantation name and number, species and age class planted, number of acres planted, number of trees planted, survival record (first and fourth growing season) and total cost of planting.

(5) Stand Improvement Record - When work is done, such as pruning and thinning, which results in improved quality, a record will be kept. This record, known as the K-V Work Inventory and Plan will be kept in a special binder by each district ranger and will be brought up-to-date annually in December.

Unless specifically stated otherwise, all plans, records, and maps will be brought up-to-date or posted annually during January. Promise cards will be set up to assure that this is done.

APPENDIX

BEARTOOTH WORKING CIRCLE

TIMBER MANAGEMENT PLAN





## INVENTORY TECHNIQUE AND ACCURACY

Data for the inventory of this plan were based on instructions issued by Region One in 1955 and 1956 and on "Instructions for Forest Inventory" prepared by the Intermountain Forest and Range Experiment Station. In brief, the technique involved was:

1. Aerial photointerpretation of 1958 pictures to define the various type strata. Accomplished in 1959 and 1960.
2. On-the-ground checking of these classifications. Done in 1960.
3. Transfer of strata classifications to a 2-inch-to-a-mile planimetric map. Done in 1960 and 1961.
4. Area calculations by strata. Done in 1961.
5. Sampling of each important strata to established standards. Done in 1960.
6. Compilation of data and testing of statistical accuracy. Done in 1961.

## RELIABILITY OF THE DATA

In determining the acreage and volume of the various forest types, there are two sources of error:

1. Technique errors in measuring, recording and compiling the information. These errors are minimized by adequate training and checking of individuals conducting the field and office work.
2. Sampling errors made whenever measurements are confined to only a portion of the population and results are applied to the whole. If time and money were not limiting factors, every tree would be measured and the sampling error reduced to zero. However, time and money are limiting factors, necessitating sampling only a portion of the population instead of the whole, thus causing estimates for the whole to be somewhat in error.

Guidelines have been established for the region so that the various strata may be sampled in such manner as to keep the error within acceptable limits. This means taking a minimum number of samples for a given degree of variability and standard of accuracy. The regional objective is to hold the sampling error in a working circle within 10 percent, two times out of three, in terms of volume. The objective has been met in this inventory since the sampling error for all strata combined is 9 percent for cubic contents (see accompanying table showing statistical highlights). This means that the total inventory volume of 113,630 M cubic feet on national-forest lands may be expected to be within + 10,227 M cubic feet (9 percent) of the true volume on the working circle, two times out of three. Similarly, the sawtimber estimate on national-forest lands is also about 552,858 M board feet + 49,757 M board feet, two times out of three.

Highlights of the coefficient of variation and the sampling error based on cubic foot volume of trees 6" and larger for the various strata of the Beartooth Working Circle:

Strata	Coefficient of Variation - Percent	Sampling Error Percent (Odds of 2 out of 3)
D9W	51	23
D9M	36	15
D9P	58	26
D8W	58	26
-----		
LP8W	51	23
LP8M	33	15
-----		
S9M	22	10
S9P	25	11
-----		
Total All Types		9

TOTAL LAND AREA BY OWNERSHIP

Beartooth Working Circle

Appendix Table 1

Block and Working Circle	Total Land Area	National Forest			State	Other Public	Forest Industry	Other Private
		Total	Nonreserved	Reserved				
Stillwater	365,441	360,321	221,794	138,527	-	-	-	5,120
Rock Creek	230,780	222,948	195,474	27,474	665	-	-	7,167
TOTAL	596,221	583,269	417,268	166,001	665	-	-	12,287

TOTAL LAND AREA BY MAJOR LAND CLASSES

Appendix Table 2

Beartooth Working Circle

Block and Working Circle	Total Acres	Non- forest Land (acres)	Forest Land (acres)				
			Total	Non- commer- cial	Commercial <sup>1/</sup>		
					Total	Stocked	Non- stocked
N.F. (Nonreserved)	221,794	71,763	150,031	91,598	58,433	58,418	15
N.F. (Reserved)	138,527	95,616	42,911	33,061	9,850	9,850	-
State	-	-	-	-	-	-	-
Other Public	-	-	-	-	-	-	-
Forest Industry	-	-	-	-	-	-	-
Other Private	5,120	3,042	2,078	1,422	656	656	-
<b>TOTAL</b>							
STILLWATER BLOCK	365,441	170,421	195,020	126,081	68,939	68,924	15
-----							
N.F. (Nonreserved)	195,474	78,085	117,389	45,189	72,200	71,240	960
N.F. (Reserved)	27,474	25,864	1,610	1,180	430	430	-
State	665	25	640	150	490	490	-
Other Public	-	-	-	-	-	-	-
Forest Industry	-	-	-	-	-	-	-
Other Private	7,167	3,624	3,543	1,823	1,720	1,720	-
<b>TOTAL</b>							
ROCK CREEK BLOCK	230,780	107,598	123,182	48,342	74,840	73,880	960
-----							
N.F. (Nonreserved)	417,268	149,848	267,420	136,787	130,633	129,658	975
N.F. (Reserved)	166,001	121,480	44,521	34,241	10,280	10,280	-
State	665	25	640	150	490	490	-
Other Public	-	-	-	-	-	-	-
Forest Industry	-	-	-	-	-	-	-
Other Private	12,287	6,666	5,621	3,245	2,376	2,376	-
<b>TOTAL</b>							
BEARTOOTH W.C.	596,221	278,019	318,202	174,423	143,779	142,804	975

<sup>1/</sup> Includes nonproductive and productive lands reserved.



COMMERCIAL FOREST LAND BY TYPE, STAND-SIZE CLASS, AND STOCKING  
(Nonreserved National-Forest Land)

Appendix Table 3a

Beartooth Working Circle

Block and Working Circle	Forest Type	Sawtimber			Poletimber			Seedling and Sapling			Non-stocked				
		Total Area	Stocking		Total	Stocking		Total	Stocking						
			Well	Med.		Poor	Well		Med.	Poor		Well	Med.	Poor	
Acres															
Stillwater Block	D	12,105	4,840	740	2,590	1,510	6,710	5,070	1,250	390	540	120	245	175	15
	P	25	-	-	-	-	25	-	25	-	-	-	-	-	-
	LP	30,762	2,300	140	1,595	565	12,395	7,875	3,135	1,385	16,067	13,522	2,065	480	-
	AF	1,830	1,075	-	775	300	520	395	110	15	235	95	125	15	-
	S	11,120	10,845	100	7,160	3,585	230	200	30	-	45	45	-	-	-
	S-AF	2,591	2,591	-	1,813	778	-	-	-	-	-	-	-	-	-
TOTAL BLK		58,433	21,651	980	13,933	6,738	19,880	13,540	4,550	1,790	16,887	13,782	2,435	670	15
Rock Creek Block	D	32,045	22,770	5,240	10,390	7,140	8,520	6,985	1,320	215	710	710	-	-	45
	P	60	-	-	-	-	60	55	-	5	-	-	-	-	-
	LP	30,650	1,745	95	890	760	17,415	9,335	6,080	2,000	10,575	6,920	2,610	1,045	915
	AF	9,340	6,675	550	4,180	1,945	2,405	1,175	480	750	260	110	90	60	-
	S	105	85	30	-	55	20	-	20	-	-	-	-	-	-
	TOTAL BLK		72,200	31,275	5,915	15,460	9,900	28,420	17,550	7,900	2,970	11,545	7,740	2,700	1,105
Beartooth W.C.	D	44,150	27,610	5,980	12,980	8,650	15,230	12,055	2,570	605	1,250	830	245	175	60
	P	85	-	-	-	-	85	55	25	5	-	-	-	-	-
	LP	61,412	4,045	235	2,485	1,325	29,810	17,210	9,215	3,385	26,642	20,442	4,675	1,525	915
	AF	11,170	7,750	550	4,955	2,245	2,925	1,570	590	765	495	205	215	75	-
	S	11,225	10,930	130	7,160	3,640	250	200	50	-	45	45	-	-	-
	S-AF	2,591	2,591	-	1,813	778	-	-	-	-	-	-	-	-	-
TOTAL W.C.		130,633	52,926	6,895	29,393	16,638	48,300	31,090	12,450	4,760	28,432	21,522	5,135	1,775	975



# TOTAL AREA BY COMPARTMENTS AND OWNERSHIPS

## Compartment Summary

Appendix Table 3b

Beartooth Working Circle

Block	Compartment	Ownership			Total
		N.F.(Nonres.)	Other Private	N.F. (Res.)	
Stillwater	101	17,125	200	--	17,325
	102	16,615	920	-	17,535
	103	13,312	143	-	13,455
	104	22,884	-	-	22,884
	105	18,460	-	-	18,460
	106	13,527	1,061	-	14,588
	107	-	-	-	-
	108	36,396	1,261	-	37,657
	109	20,847	925	-	21,772
	110	10,055	-	-	10,055
	111	52,668	595	-	53,263
	112	-	-	-	-
	113	-	15	81,546	81,561
	114	-	-	56,981	56,981
TOTAL BLOCK		221,889	5,120	138,527	365,536
<hr style="border-top: 1px dashed black;"/>					
Rock Creek	201	12,187	845	-	13,032
	202	8,977	1,086	-	10,063
	203	18,146	665	-	18,811
	204	18,183	1,346	-	19,529
	205	23,559	453	-	24,012
	206	15,222	160	-	15,382
	207	23,925	-	-	23,925
	208	-	-	27,474	27,474
	209	9,819	211	-	10,030
	210	6,848	1,913	-	8,761
	211	9,431	843	-	10,274
	212	5,576	-	-	5,576
	213	7,843	310	-	8,153
	214	12,237	-	-	12,237
	215	9,047	-	-	9,047
	216	14,474	-	-	14,474
TOTAL BLOCK		195,474	7,832	27,474	230,780

NET VOLUME (BOARD FEET) SAWTIMBER-SIZE TREES BY SPECIES AND OWNER  
(In Pole and Sawtimber Stands - Stocked Nonreserved Commercial Forest)

Appendix Table 4

Beartooth Working Circle

Block and Working Circle	Owner	Acres	Total Volume (MBF)	Volume by Species - MBF						
				W	P	L-D	S	H-AF-GF	LP-WLP	C
Stillwater Block	National Forest	41,531	236,391	-	25	60,134	79,014	21,252	75,966	-
	State	-	-	-	-	-	-	-	-	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
TOTAL STILLWATER BLOCK	Other Private	601	2,232	-	35	548	519	464	666	-
		42,132	238,623	-	60	60,682	79,533	21,716	76,632	-
Rock Creek Block	National Forest	59,695	316,467	-	115	233,780	8,158	30,633	43,781	-
	State	285	303	-	-	41	-	21	241	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
TOTAL ROCK CREEK BLOCK	Other Private	1,219	4,174	-	-	2,014	85	1,088	987	-
		61,199	320,944	-	115	235,835	8,243	31,742	45,009	-
Beartooth W.C.	National Forest	101,226	552,858	-	140	293,914	87,172	51,885	119,747	-
	State	285	303	-	-	41	-	21	241	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
TOTAL BEARTOOTH WORKING CIRCLE	Other Private	1,820	6,406	-	35	2,562	604	1,552	1,653	-
		103,331	559,567	-	175	296,517	87,776	53,458	121,641	-

NET VOLUME (PARTIAL CUBIC FEET) SAWTIMBER-SIZE TREES BY SPECIES AND OWNER  
(In Pole and Sawtimber Stands - Stocked Nonreserved Commercial Forest)

Appendix Table 5

Beartooth Working Circle

Block and Working Circle	Owner	Acres	Total Volume (Mcf)	Volume by Species - Mcf						
				W	P	L-D	S	H-AF-GF	LP-MLP	C
Stillwater Block	National Forest	41,531	49,793	-	5	12,526	16,128	4,619	16,515	-
	State	-	-	-	-	-	-	-	-	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
	Other Private	601	466	-	-	114	106	101	145	-
TOTAL STILLWATER BLOCK		42,132	50,259	-	5	12,640	16,234	4,720	16,660	-
Rock Creek Block	National Forest	59,695	66,563	-	23	48,697	1,665	6,660	9,518	-
	State	285	66	-	-	9	-	5	52	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
	Other Private	1,219	889	-	-	420	17	237	215	-
TOTAL ROCK CREEK BLOCK		61,199	67,518	-	23	49,126	1,682	6,902	9,785	-
Beartooth W.C.	National Forest	101,226	116,356	-	28	61,223	17,793	11,279	26,033	-
	State	285	66	-	-	9	-	5	52	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
	Other Private	1,820	1,355	-	-	534	123	338	360	-
TOTAL BEARTOOTH WORKING CIRCLE		103,331	117,777	-	28	61,766	17,916	11,622	26,445	-

NET VOLUME (PARTIAL CUBIC FEET) POLETIMBER-SIZE TREES BY SPECIES AND OWNER  
(In Pole and Sawtimber Stands - Stocked Nonreserved Commercial Forest)

Appendix Table 6

Beartooth Working Circle

Block and Working Circle	Owner	Acres	Total Volume (Mcf)	Volume by Species - Mcf						
				W	P	L-D	S	H-AF-GF	LP-WLP	C
Stillwater Block	National Forest	41,531	47,866	-	5	11,906	4,253	5,661	26,041	-
	State	-	-	-	-	-	-	-	-	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
TOTAL STILLWATER BLOCK	Other Private	601	581	-	5	102	31	72	371	-
		42,132	48,447	-	10	12,008	4,284	5,733	26,412	-
Rock Creek Block	National Forest	59,695	65,764	-	18	23,894	205	8,492	33,155	-
	State	285	394	-	-	6	2	6	380	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
TOTAL ROCK CREEK BLOCK	Other Private	1,219	1,465	-	-	397	3	262	803	-
		61,199	67,623	-	18	24,297	210	8,760	34,338	-
Beartooth W.C.	National Forest	101,226	113,630	-	23	35,800	4,458	14,153	59,196	-
	State	285	394	-	-	6	2	6	380	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
TOTAL BEARTOOTH WORKING CIRCLE	Other Private	1,820	2,046	-	5	499	34	334	1,174	-
		103,331	116,070	-	28	36,305	4,494	14,493	60,750	-



NET VOLUME (PARTIAL CUBIC FEET) POLE-AND SAWTIMBER-SIZE TREES BY SPECIES AND OWNER  
(In Pole and Sawtimber Stands - Stocked Nonreserved Commercial Forest)

Appendix Table 7

Beartooth Working Circle

Block and Working Circle	Owner	Acres	Total Volume (Mcf)	Volume by Species - Mcf						
				W	P	L-D	S	H-AF-GF	LP-WLP	C
Stillwater Block	National Forest	41,531	97,659	-	10	24,432	20,381	10,280	42,556	-
	State	-	-	-	-	-	-	-	-	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
	Other Private	601	1,047	-	5	216	137	173	516	-
TOTAL STILLWATER BLOCK		42,132	98,706	-	15	24,648	20,518	10,453	43,072	-
Rock Creek Block	National Forest	59,695	132,327	-	41	72,591	1,870	15,152	42,673	-
	State	285	460	-	-	15	2	11	432	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
	Other Private	1,219	2,354	-	-	817	20	499	1,018	-
TOTAL ROCK CREEK BLOCK		61,199	135,141	-	41	73,423	1,892	15,662	44,123	-
Beartooth W.C.	National Forest	101,226	229,986	-	51	97,023	22,251	25,432	85,229	-
	State	285	460	-	-	15	2	11	432	-
	Other Public	-	-	-	-	-	-	-	-	-
	Forest Industry	-	-	-	-	-	-	-	-	-
	Other Private	1,820	3,398	-	5	1,033	157	672	1,534	-
TOTAL BEARTOOTH WORKING CIRCLE		103,331	233,847	-	56	98,071	22,410	26,115	87,195	-

1/ Summary of Tables 5 and 6



NET VOLUME (BOARD FEET) SAWTIMBER-SIZE TREES BY STRATA  
(Pole and Sawtimber Stands - Nonreserved National-Forest Lands)

Appendix Table 8

Beartooth Working Circle

STILLWATER BLOCK

Strata	Acres	Total Volume (MBF)	Volume by Species - MBF					
			W	P	L-D	S	H-AF-GF	LP-WLP
<u>Sawtimber</u>								
D	4,840	48,458	-	-	44,837	1,520	261	1,840
LP	2,300	23,026	-	-	2,129	1,009	1,874	18,014
AF	1,075	5,163	-	-	-	-	3,700	1,463
S	10,845	119,834	-	-	5,105	71,091	4,461	39,177
S-AF	2,591	20,753	-	-	622	4,923	8,705	6,503
TOTAL	21,651	217,234	-	-	52,693	78,543	19,001	66,997
<u>Poletimber</u>								
D	6,710	7,730	-	-	6,509	-	1,181	40
P	25	38	-	25	13	-	-	-
LP	12,395	10,256	-	-	904	140	456	8,756
AF	520	431	-	-	-	-	338	93
S	230	702	-	-	15	331	276	80
TOTAL	19,880	19,157	-	25	7,441	471	2,251	8,969
<u>Total</u>								
D	11,550	56,188	-	-	51,346	1,520	1,442	1,880
P	25	38	-	25	13	-	-	-
LP	14,695	33,282	-	-	3,033	1,149	2,330	26,770
AF	1,595	5,594	-	-	-	-	4,038	1,556
S	11,075	120,536	-	-	5,120	71,422	4,737	39,257
S-AF	2,591	20,753	-	-	622	4,923	8,705	6,503
GRAND TOTAL	41,531	236,391	-	25	60,134	79,014	21,252	75,966

(Continued on next page)

Appendix Table 8 (Continued)

Beartooth Working Circle

## ROCK CREEK BLOCK

Strata	Acres	Total Volume (MBF)	Volume by Species - MBF							
			W	P	L-D	S	H-AF-GF	LP-WLP	C	
<u>Sawtimber</u>										
D	22,770	239,457	-	-	222,269	6,771	1,042	9,375	-	-
LP	1,745	15,376	-	-	1,499	665	1,288	11,924	-	-
AF	6,675	33,777	-	-	-	-	24,460	9,317	-	-
S	85	881	-	-	38	501	173	169	-	-
TOTAL	31,275	289,491	-	-	223,806	7,937	26,963	30,785	-	-
<u>Poletimber</u>										
D	8,520	9,926	-	-	8,348	-	1,555	23	-	-
P	60	115	-	115	-	-	-	-	-	-
LP	17,415	15,243	-	-	1,616	201	813	12,613	-	-
AF	2,405	1,652	-	-	-	-	1,292	360	-	-
S	20	40	-	-	10	20	10	-	-	-
TOTAL	28,420	26,976	-	115	9,974	221	3,670	12,996	-	-
<u>Total</u>										
D	31,290	249,383	-	-	230,617	6,771	2,597	9,398	-	-
P	60	115	-	115	-	-	-	-	-	-
LP	19,160	30,619	-	-	3,115	866	2,101	24,537	-	-
AF	9,080	35,429	-	-	-	-	25,752	9,677	-	-
S	105	921	-	-	48	521	183	169	-	-
GRAND TOTAL	59,695	316,467	-	115	233,780	8,158	30,633	43,781	-	-

(Continued on next page)

Appendix Table 8 (Continued)

Beartooth Working Circle

## SUMMARY

Strata	Acres	Total Volume (MBF)	Volume by Species - MBF							
			W	P	L-D	S	H-AF-GF	LP-WLP	C	
<u>Sawtimber</u>										
D	27,610	287,915	-	-	267,106	8,291	1,303	11,215	-	-
LP	4,045	38,402	-	-	3,628	1,674	3,162	29,938	-	-
AF	7,750	38,940	-	-	-	-	28,160	10,780	-	-
S	10,930	120,715	-	-	5,143	71,592	4,634	39,346	-	-
S-AF	2,591	20,753	-	-	622	4,923	8,705	6,503	-	-
TOTAL	52,926	506,725	-	-	276,499	86,480	45,964	97,782	-	-
<u>Poletimber</u>										
D	15,230	17,656	-	-	14,857	-	2,736	63	-	-
P	85	153	-	140	13	-	-	-	-	-
LP	29,810	25,499	-	-	2,520	341	1,269	21,369	-	-
AF	2,925	2,083	-	-	-	-	1,630	453	-	-
S	250	742	-	-	25	351	286	80	-	-
TOTAL	48,300	46,133	-	140	17,415	692	5,921	21,965	-	-
<u>Total</u>										
D	42,840	305,571	-	-	281,963	8,291	4,039	11,278	-	-
P	85	153	-	140	13	-	-	-	-	-
LP	33,855	63,901	-	-	6,148	2,015	4,431	51,307	-	-
AF	10,675	41,023	-	-	-	-	29,790	11,233	-	-
S	11,180	121,457	-	-	5,168	71,943	4,920	39,426	-	-
S-AF	2,591	20,753	-	-	622	4,923	8,705	6,503	-	-
GRAND TOTAL										
WORKING	101,226	552,858	-	140	293,914	87,172	51,885	119,747	-	-
CIRCLE										

**NET VOLUME (PARTIAL CUBIC FEET) SAWTIMBER-SIZE TREES BY STRATA**  
**(Pole and Sawtimber Stands - Nonreserved National-Forest Lands)**

**Appendix Table 9**

**Beartooth Working Circle**

STILLWATER BLOCK									
Strata	Acres	Total Volume (Mcf)	Volume by Species - Mcf						
			W	P	L-D	S	H-AF-GF	LP-WLP	C
<u>Sawtimber</u>	D	10,107	-	-	9,340	310	57	400	-
	LP	4,972	-	-	443	206	407	3,916	-
	AF	1,122	-	-	-	-	804	318	-
	S	25,060	-	-	1,063	14,510	970	8,517	-
	S-AF	4,441	-	-	130	1,005	1,892	1,414	-
	TOTAL	21,651	45,702	-	-	10,976	16,031	4,130	14,565
<u>Poletimber</u>	D	1,622	-	-	1,356	-	257	9	-
	P	8	-	5	3	-	-	-	-
	LP	2,220	-	-	188	29	99	1,904	-
	AF	93	-	-	-	-	73	20	-
	S	148	-	-	-	68	60	17	-
	TOTAL	19,880	4,091	-	5	1,550	97	489	1,950
<u>Total</u>	D	11,729	-	-	10,696	310	314	409	-
	P	8	-	5	3	-	-	-	-
	LP	7,192	-	-	631	235	506	5,820	-
	AF	1,215	-	-	-	-	877	338	-
	S	25,208	-	-	1,066	14,578	1,030	8,534	-
	S-AF	4,441	-	-	130	1,005	1,892	1,414	-
GRAND TOTAL		41,531	-	5	12,526	16,128	4,619	16,515	-

(Continued on next page)



## ROCK CREEK BLOCK

Strata	Acres	Total Volume (Mcf)	Volume by Species - Mcf							
			W	P	L-D	S	H-AF-GF	LP-WLP	C	
<u>Sawtimber</u>										
D	22,770	49,945	-	-	46,299	1,382	226	2,038	-	-
LP	1,745	3,320	-	-	312	136	280	2,592	-	-
AF	6,675	7,344	-	-	-	-	5,318	2,026	-	-
S	85	185	-	-	8	102	38	37	-	-
TOTAL	31,275	60,794	-	-	46,619	1,620	5,862	6,693	-	-
<u>Poletimber</u>										
D	8,520	2,082	-	-	1,739	-	338	5	-	-
P	60	23	-	23	-	-	-	-	-	-
LP	17,415	3,297	-	-	337	41	177	2,742	-	-
AF	2,405	359	-	-	-	-	281	78	-	-
S	20	8	-	-	2	4	2	-	-	-
TOTAL	28,420	5,769	-	23	2,078	45	798	2,825	-	-
<u>Total</u>										
D	31,290	52,027	-	-	48,038	1,382	564	2,043	-	-
P	60	23	-	23	-	-	-	-	-	-
LP	19,160	6,617	-	-	649	177	457	5,334	-	-
AF	9,080	7,703	-	-	-	-	5,599	2,104	-	-
S	105	193	-	-	10	106	40	37	-	-
GRAND TOTAL	59,695	66,563	-	23	48,697	1,665	6,660	9,518	-	-

(Continued on next page)



Appendix Table 2 (Continued)

Beartooth Working Circle

## SUMMARY

Strata	Acres	Total Volume (Mcf)	Volume by Species - Mcf						C
			W	P	L-D	S	H-AF-GF	LP-WLP	
<u>Sawtimber</u>									
D	27,610	60,052	-	-	55,639	1,692	283	2,438	-
LP	4,045	8,292	-	-	755	342	687	6,508	-
AF	7,750	8,466	-	-	-	-	6,122	2,344	-
S	10,930	25,245	-	-	1,071	14,612	1,008	8,554	-
S-AF	2,591	4,441	-	-	130	1,005	1,892	1,414	-
TOTAL	52,926	106,496	-	-	57,595	17,651	9,992	21,258	-
<u>Poletimber</u>									
D	15,230	3,704	-	-	3,095	-	595	14	-
P	85	31	-	28	3	-	-	-	-
LP	29,810	5,517	-	-	525	70	276	4,646	-
AF	2,925	452	-	-	-	-	354	98	-
S	250	156	-	-	5	72	62	17	-
TOTAL	48,300	9,860	-	28	3,628	169	1,287	4,775	-
<u>Total</u>									
D	42,840	63,756	-	-	58,734	1,692	878	2,452	-
P	85	31	-	28	3	-	-	-	-
LP	33,855	13,809	-	-	1,280	412	963	11,154	-
AF	10,675	8,918	-	-	-	-	6,476	2,442	-
S	11,180	25,401	-	-	1,076	14,684	1,070	8,571	-
S-AF	2,591	4,441	-	-	130	1,005	1,892	1,414	-
GRAND TOTAL									
WORKING	101,226	116,356	-	28	61,223	17,793	11,279	26,033	-
CIRCLE									

NET VOLUME (PARTIAL CUBIC FEET) POLETIMBER-SIZE TREES BY STRATA  
(Pole and Sawtimber Stands - Nonreserved National-Forest Lands)

Appendix Table 10

Beartooth Working Circle

STILLWATER BLOCK

Strata	Acres	Total Volume (Mcf)	Volume by Species - Mcf					
			W	P	L-D	S	H-AF-GF	LP-WLP
<u>Sawtimber</u>								
D	4,840	3,715	-	-	2,468	-	261	986
LP	2,300	2,565	-	-	183	138	249	1,995
AF	1,075	788	-	-	-	-	771	17
S	10,845	9,119	-	-	431	3,469	2,032	3,187
S-AF	2,591	2,070	-	-	54	425	1,179	412
TOTAL	21,651	18,257	-	-	3,136	4,032	4,492	6,597
<u>Poletimber</u>								
D	6,710	10,117	-	-	8,619	-	540	958
P	25	6	-	5	1	-	-	-
LP	12,395	18,518	-	-	149	46	121	18,202
AF	520	647	-	-	-	-	366	281
S	230	321	-	-	1	175	142	3
TOTAL	19,880	29,609	-	5	8,770	221	1,169	19,444
<u>Total</u>								
D	11,550	13,832	-	-	11,087	-	801	1,944
P	25	6	-	5	1	-	-	-
LP	14,695	21,083	-	-	332	184	370	20,197
AF	1,595	1,435	-	-	-	-	1,137	298
S	11,075	9,440	-	-	432	3,644	2,174	3,190
S-AF	2,591	2,070	-	-	54	425	1,179	412
GRAND TOTAL	41,531	47,866	-	5	11,906	4,253	5,661	26,041

(Continued on next page)

Appendix Table 10 (Continued)

Beartooth Working Circle

## ROCK CREEK BLOCK

Strata	Acres	Total Volume (Mcf)	Volume by Species - Mcf							
			W	P	L-D	S	H-AF-GF	LP-WLP	C	
<u>Sawtimber</u>										
D	22,770	17,864	-	-	12,145	-	1,042	4,677	-	-
LP	1,745	2,011	-	-	161	97	173	1,580	-	-
AF	6,675	4,976	-	-	-	-	4,870	106	-	-
S	85	48	-	-	-	18	12	18	-	-
TOTAL	31,275	24,899	-	-	12,306	115	6,097	6,381	-	-
<u>Poletimber</u>										
D	8,520	13,291	-	-	11,320	-	707	1,264	-	-
P	60	24	-	18	6	-	-	-	-	-
LP	17,415	25,179	-	-	262	80	224	24,613	-	-
AF	2,405	2,351	-	-	-	-	1,456	895	-	-
S	20	20	-	-	-	10	8	2	-	-
TOTAL	28,420	40,865	-	18	11,588	90	2,395	26,774	-	-
<u>Total</u>										
D	31,290	31,155	-	-	23,465	-	1,749	5,941	-	-
P	60	24	-	18	6	-	-	-	-	-
LP	19,160	27,190	-	-	423	177	397	26,193	-	-
AF	9,080	7,327	-	-	-	-	6,326	1,001	-	-
S	105	68	-	-	-	28	20	20	-	-
GRAND TOTAL	59,695	65,764	-	18	23,894	205	8,492	33,155	-	-

(Continued on next page)

Appendix Table 10 (Continued)

Beartooth Working Circle

## SUMMARY

Strata	Acres	Total Volume (Mcf)	Volume by Species - Mcf							
			W	P	L-D	S	H-AF-GF	LP-WLP	C	
<u>Sawtimber</u>										
D	27,610	21,579	-	-	14,613	-	1,303	5,663	-	
LP	4,045	4,576	-	-	344	235	422	3,575	-	
AF	7,750	5,764	-	-	-	-	5,641	123	-	
S	10,930	9,167	-	-	431	3,487	2,044	3,205	-	
S-AF	2,591	2,070	-	-	54	425	1,179	412	-	
TOTAL	52,926	43,156	-	-	15,442	4,147	10,589	12,978	-	
<u>Poletimber</u>										
D	15,230	23,408	-	-	19,939	-	1,247	2,222	-	
P	85	30	-	23	7	-	-	-	-	
LP	29,810	43,697	-	-	411	126	345	42,815	-	
AF	2,925	2,998	-	-	-	-	1,822	1,176	-	
S	250	341	-	-	1	185	150	5	-	
TOTAL	48,300	70,474	-	23	20,358	311	3,564	46,218	-	
<u>Total</u>										
D	42,840	44,987	-	-	34,552	-	2,550	7,885	-	
P	85	30	-	23	7	-	-	-	-	
LP	33,855	48,273	-	-	755	361	767	46,390	-	
AF	10,675	8,762	-	-	-	-	7,463	1,299	-	
S	11,180	9,508	-	-	432	3,672	2,194	3,210	-	
S-AF	2,591	2,070	-	-	54	425	1,179	412	-	
GRAND TOTAL WORKING CIRCLE	101,226	113,630	-	23	35,800	4,458	14,153	59,196	-	



**NET VOLUME (PARTIAL CUBIC FEET) OF SAWTIMBER-AND POLETIMBER-SIZE TREES BY STRATA**  
**(Pole and Sawtimber Size Stands - Nonreserved National-Forest Land)**

**Appendix Table 11**

Beartooth Working Circle

**STILLWATER BLOCK**

Strata	Acres	Total Volume (Mcf)	Volume by Species - Mcf							
			W	P	L-D	S	H-AF-GF	LP-WLP	C	
<u>Sawtimber</u>										
D	4,840	13,822	-	-	11,808	310	318	1,386	-	-
LP	2,300	7,537	-	-	626	344	656	5,911	-	-
AF	1,075	1,910	-	-	-	-	1,575	335	-	-
S	10,845	34,179	-	-	1,494	17,979	3,002	11,704	-	-
S-AF	2,591	6,511	-	-	184	1,430	3,071	1,826	-	-
TOTAL	21,651	63,959	-	-	14,112	20,063	8,622	21,162	-	-
<u>Poletimber</u>										
D	6,710	11,739	-	-	9,975	-	797	967	-	-
P	25	14	-	10	4	-	-	-	-	-
LP	12,395	20,738	-	-	337	75	220	20,106	-	-
AF	520	740	-	-	-	-	439	301	-	-
S	230	469	-	-	4	243	202	20	-	-
TOTAL	19,880	33,700	-	10	10,320	318	1,658	21,394	-	-
<u>Total</u>										
D	11,550	25,561	-	-	21,783	310	1,115	2,353	-	-
P	25	14	-	10	4	-	-	-	-	-
LP	14,695	28,275	-	-	963	419	876	26,017	-	-
AF	1,595	2,650	-	-	-	-	2,014	636	-	-
S	11,075	34,648	-	-	1,498	18,222	3,204	11,724	-	-
S-AF	2,591	6,511	-	-	184	1,430	3,071	1,826	-	-
GRAND TOTAL	41,531	97,659	-	10	24,432	20,381	10,280	42,556	-	-

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## ROCK CREEK BLOCK

Strata	Acres	Total Volume (Mcf)	Volume by Species - Mcf							
			W	P	L-D	S	H-AF-GF	LP-WLP	C	
<u>Sawtimber</u>										
D	22,770	67,809	-	-	58,444	1,382	1,268	6,715	-	-
LP	1,745	5,331	-	-	473	233	453	4,172	-	-
AF	6,675	12,320	-	-	-	-	10,188	2,132	-	-
S	85	233	-	-	8	120	50	55	-	-
TOTAL	31,275	85,693	-	-	58,925	1,735	11,959	13,074	-	-
<u>Poletimber</u>										
D	8,520	15,373	-	-	13,059	-	1,045	1,269	-	-
P	60	47	-	41	6	-	-	-	-	-
LP	17,415	28,476	-	-	599	121	401	27,355	-	-
AF	2,405	2,710	-	-	-	-	1,737	973	-	-
S	20	28	-	-	2	14	10	2	-	-
TOTAL	28,420	46,634	-	41	13,666	135	3,193	29,599	-	-
<u>Total</u>										
D	31,290	83,182	-	-	71,503	1,382	2,313	7,984	-	-
P	60	47	-	41	6	-	-	-	-	-
LP	19,160	33,807	-	-	1,072	354	854	31,527	-	-
AF	9,080	15,030	-	-	-	-	11,925	3,105	-	-
S	105	261	-	-	10	134	60	57	-	-
GRAND TOTAL	59,695	132,327	-	41	72,591	1,870	15,152	42,673	-	-

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Appendix Table 11 (Continued)

Beartooth Working Circle

## SUMMARY

Strata	Acres	Total Volume (Mcf)	Volume by Species - Mcf							
			W	P	L-D	S	H-AF-GF	LP-WLP	C	
<u>Sawtimber</u>										
D	27,610	81,631	-	-	70,252	1,692	1,586	8,101	-	-
LP	4,045	12,868	-	-	1,099	577	1,109	10,083	-	-
AF	7,750	14,230	-	-	-	-	11,763	2,467	-	-
S	10,930	34,412	-	-	1,502	18,099	3,052	11,759	-	-
S-AF	2,591	6,511	-	-	184	1,430	3,071	1,826	-	-
TOTAL	52,926	149,652	-	-	73,037	21,798	20,581	34,236	-	-
<u>Poletimber</u>										
D	15,230	27,112	-	-	23,034	-	1,842	2,236	-	-
P	85	61	-	51	10	-	-	-	-	-
LP	29,810	49,214	-	-	936	196	621	47,461	-	-
AF	2,925	3,450	-	-	-	-	2,176	1,274	-	-
S	250	497	-	-	6	257	212	22	-	-
TOTAL	48,300	80,334	-	51	23,986	453	4,851	50,993	-	-
<u>Total</u>										
D	42,840	108,743	-	-	93,286	1,692	3,428	10,337	-	-
P	85	61	-	51	10	-	-	-	-	-
LP	33,855	62,082	-	-	2,035	773	1,730	57,544	-	-
AF	10,675	17,680	-	-	-	-	13,939	3,741	-	-
S	11,180	34,909	-	-	1,508	18,356	3,264	11,781	-	-
S-AF	2,591	6,511	-	-	184	1,430	3,071	1,826	-	-
GRAND TOTAL	101,226	229,986	-	51	97,023	22,251	25,432	85,229	-	-
WORKING CIRCLE										

NET VOLUME (PARTIAL CUBIC FOOT) PER ACRE BY STRATA  
Nonreserved National-Forest Land

A. SAWTIMBER-SIZE TREES (11" & over DBH)

Appendix Table 12

Beartooth Working Circle

Strata	Cubic Feet per Acre by Species												Total
	W	P	L	D	S	AF	GF	H	LP	WLP	C	Hdw.	
D9W	-	-	-	3,560	60	20	-	-	110	-	-	-	3,750
D9M	-	-	-	2,180	100	-	-	-	20	-	-	-	2,300
D9P	-	-	-	690	-	-	-	-	170	-	-	-	860
D8W	-	-	-	210	-	40	-	-	-	-	-	-	250
D8M	-	-	-	190	-	20	-	-	-	-	-	-	210
D8P	-	-	-	170	-	20	-	-	20	-	-	-	210
P8W	-	400	-	-	-	-	-	-	-	-	-	-	400
P8M	-	200	-	100	-	-	-	-	-	-	-	-	300
P8P	-	200	-	-	-	-	-	-	-	-	-	-	200
LP9W	-	-	-	1,000	140	240	-	-	2,340	-	-	-	3,720
LP9M	-	-	-	150	100	200	-	-	1,950	-	-	-	2,400
LP9P	-	-	-	100	40	110	-	-	820	-	-	-	1,070
LP8W	-	-	-	-	-	-	-	-	150	-	-	-	150
LP8M	-	-	-	40	-	20	-	-	200	-	-	-	260
LP8P	-	-	-	40	20	20	-	-	60	-	-	-	140

(Continued on next page)



Appendix Table 12 (Continued)

Beartooth Working Circle

Strata	Cubic Feet per Acre by Species												Total
	W	P	L	D	S	AF	GF	H	IP	WLP	C	Hdw.	
AF9W	-	-	-	-	-	1,520	-	-	430	-	-	-	1,950
AF9M	-	-	-	-	-	870	-	-	330	-	-	-	1,200
AF9P	-	-	-	-	-	430	-	-	220	-	-	-	650
AF8W	-	-	-	-	-	150	-	-	40	-	-	-	190
AF8M	-	-	-	-	-	100	-	-	20	-	-	-	120
AF8P	-	-	-	-	-	60	-	-	20	-	-	-	80
S9W	-	-	-	190	1,840	1,130	-	-	300	-	-	-	3,460
S9M	-	-	-	120	1,570	90	-	-	930	-	-	-	2,710
S9P	-	-	-	40	860	60	-	-	500	-	-	-	1,460
S8W	-	-	-	-	310	280	-	-	90	-	-	-	680
S8M	-	-	-	100	200	110	-	-	-	-	-	-	410
S-AF9M	-	-	-	60	450	850	-	-	630	-	-	-	1,990
S-AF9P	-	-	-	20	240	460	-	-	350	-	-	-	1,070

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B. POLETIMBER-SIZE TREES (5"-11" DBH)

Appendix Table 12 (Continued)

Beartooth Working Circle

Strata	Cubic Feet per Acre by Species												Total
	W	P	L	D	S	AF	GF	H	LP	WLP	C	Hdw.	
D9W	-	-	-	910	-	-	-	-	-	50	-	-	960
D9M	-	-	-	600	-	100	-	-	-	40	-	-	740
D9P	-	-	-	160	-	-	-	-	-	560	-	-	720
D8W	-	-	-	1,440	-	90	-	-	-	160	-	-	1,690
D8M	-	-	-	850	-	50	-	-	-	100	-	-	1,000
D8P	-	-	-	650	-	50	-	-	-	50	-	-	750
P8W	-	300	-	100	-	-	-	-	-	-	-	-	400
P8M	-	200	-	50	-	-	-	-	-	-	-	-	250
P8P	-	100	-	50	-	-	-	-	-	-	-	-	150
LP9W	-	-	-	250	150	390	-	-	-	680	-	-	1,470
LP9M	-	-	-	50	60	100	-	-	-	830	-	-	1,040
LP9P	-	-	-	120	40	60	-	-	-	1,020	-	-	1,240
LP8W	-	-	-	-	-	-	-	-	-	1,720	-	-	1,720
LP8M	-	-	-	30	10	30	-	-	-	1,180	-	-	1,250
LP8P	-	-	-	40	10	20	-	-	-	690	-	-	760

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Appendix Table 12 (Continued)

Beartooth Working Circle

Strata	Cubic Feet per Acre by Species												Total
	W	P	L	D	S	AF	GF	H	LP	WLP	C	Hdw.	
AF9W	-	-	-	-	-	1,000	-	-	-	10	-	-	1,010
AF9M	-	-	-	-	-	800	-	-	-	10	-	-	810
AF9P	-	-	-	-	-	500	-	-	-	30	-	-	530
AF8W	-	-	-	-	-	750	-	-	-	680	-	-	1,430
AF8M	-	-	-	-	-	570	-	-	-	100	-	-	670
AF8P	-	-	-	-	-	400	-	-	-	60	-	-	460
S9W	-	-	-	-	310	250	-	-	-	-	-	-	560
S9M	-	-	-	60	400	250	-	-	-	280	-	-	990
S9P	-	-	-	-	160	60	-	-	-	330	-	-	550
S8W	-	-	-	-	800	650	-	-	-	-	-	-	1,450
S8M	-	-	-	20	500	400	-	-	100	-	-	-	1,020
S-AF9M	-	-	-	30	200	530	-	-	150	-	-	-	910
S-AF9P	-	-	-	-	80	280	-	-	180	-	-	-	540

(Continued on next page)

C. SAWTIMBER AND POLE SIZE TREES

Appendix Table 12 (Continued)

Beartooth Working Circle

Strata	Cubic Feet per Acre by Species												Total
	W	P	L	D	S	AF	GF	H	LP	WLP	C	Hdw.	
D9W	-	-	-	20,660	360	20	-	-	610	-	-	-	21,650
D9M	-	-	-	12,680	600	100	-	-	120	-	-	-	13,500
D9P	-	-	-	3,990	-	-	-	-	970	-	-	-	4,960
D8W	-	-	-	1,210	-	240	-	-	-	-	-	-	1,450
D8M	-	-	-	1,090	-	120	-	-	-	-	-	-	1,210
D8P	-	-	-	970	-	120	-	-	120	-	-	-	1,210
P8W	-	2,400	-	-	-	-	-	-	-	-	-	-	2,400
P8M	-	1,200	-	600	-	-	-	-	-	-	-	-	1,800
P8P	-	1,200	-	-	-	-	-	-	-	-	-	-	1,200
LP9W	-	-	-	6,200	840	1,340	-	-	13,140	-	-	-	21,520
LP9M	-	-	-	850	600	1,100	-	-	10,950	-	-	-	13,500
LP9P	-	-	-	600	240	610	-	-	4,620	-	-	-	6,070
LP8W	-	-	-	-	-	-	-	-	850	-	-	-	850
LP8M	-	-	-	240	-	120	-	-	1,100	-	-	-	1,460
LP8P	-	-	-	240	120	120	-	-	360	-	-	-	840

(Continued on next page)



Strata	Cubic Feet per Acre by Species												Total
	W	P	L	D	S	AF	GF	H	LP	WLP	C	Hdw.	
AF9W	-	-	-	8,520	-	-	-	-	2,430	-	-	-	10,950
AF9M	-	-	-	-	-	4,870	-	-	1,830	-	-	-	6,700
AF9P	-	-	-	-	-	2,430	-	-	1,220	-	-	-	3,650
AF8W	-	-	-	-	-	850	-	-	240	-	-	-	1,090
AF8M	-	-	-	-	-	600	-	-	120	-	-	-	720
AF8P	-	-	-	-	-	360	-	-	120	-	-	-	480
S9W	-	-	-	1,090	10,840	6,330	-	-	1,700	-	-	-	19,960
S9M	-	-	-	720	9,270	490	-	-	5,230	-	-	-	15,710
S9P	-	-	-	240	5,060	360	-	-	2,800	-	-	-	8,460
S8W	-	-	-	-	1,810	1,580	-	-	490	-	-	-	3,880
S8M	-	-	-	600	1,200	610	-	-	-	-	-	-	2,410
S-AF9M	-	-	-	360	2,650	4,750	-	-	3,530	-	-	-	11,290
S-AF9P	-	-	-	120	1,440	2,560	-	-	1,950	-	-	-	6,070

NET VOLUME (BOARD FEET) PER ACRE BY STRATA  
Nonreserved National-Forest Land

SAWTIMBER-SIZE TREES (11" & over DBH)

Appendix Table 13

Beartooth Working Circle

Strata	Board Feet per Acre by Species												Total
	W	P	L	D	S	AF	GF	H	LP	WLP	C	Hdw.	
D9W	-	-	-	17,100	300	-	-	-	500	-	-	-	17,900
D9M	-	-	-	10,500	500	100	-	-	100	-	-	-	11,200
D9P	-	-	-	3,300	-	-	-	-	800	-	-	-	4,100
D8W	-	-	-	1,000	-	200	-	-	-	-	-	-	1,200
D8M	-	-	-	900	-	100	-	-	-	-	-	-	1,000
D8P	-	-	-	800	-	100	-	-	100	-	-	-	1,000
P8W	-	2,000	-	-	-	-	-	-	-	-	-	-	2,000
P8M	-	1,000	-	500	-	-	-	-	-	-	-	-	1,500
P8P	-	1,000	-	-	-	-	-	-	-	-	-	-	1,000
LP9W	-	-	-	5,200	700	1,100	-	-	10,800	-	-	-	17,800
LP9M	-	-	-	700	500	900	-	-	9,000	-	-	-	11,100
LP9P	-	-	-	500	200	500	-	-	3,800	-	-	-	5,000
LP8W	-	-	-	-	-	-	-	-	700	-	-	-	700
LP8M	-	-	-	200	-	100	-	-	900	-	-	-	1,200
LP8P	-	-	-	200	100	100	-	-	300	-	-	-	700

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Appendix Table 13 (Continued)

Beartooth Working Circle

Strata	Board Feet per Acre by Species												Total
	W	P	L	D	S	AF	GF	H	LP	WLP	C	Hdw.	
AF9W	-	-	-	-	-	7,000	-	-	2,000	-	-	-	9,000
AF9M	-	-	-	-	-	4,000	-	-	1,500	-	-	-	5,500
AF9P	-	-	-	-	-	2,000	-	-	1,000	-	-	-	3,000
AF8W	-	-	-	-	-	700	-	-	200	-	-	-	900
AF8M	-	-	-	-	-	500	-	-	100	-	-	-	600
AF8P	-	-	-	-	-	300	-	-	100	-	-	-	400
S9W	-	-	-	900	9,000	5,200	-	-	1,400	-	-	-	16,500
S9M	-	-	-	600	7,700	400	-	-	4,300	-	-	-	13,000
S9P	-	-	-	200	4,200	300	-	-	2,300	-	-	-	7,000
S8W	-	-	-	-	1,500	1,300	-	-	400	-	-	-	3,200
S8M	-	-	-	500	1,000	500	-	-	-	-	-	-	2,000
S-AF9M	-	-	-	300	2,200	3,900	-	-	2,900	-	-	-	9,300
S-AF9P	-	-	-	100	1,200	2,100	-	-	1,600	-	-	-	5,000

CONVERTING FACTORS

National-Forest Lands

Appendix Table 14

Beartooth Working Circle

a. Board Foot - Cubic Foot Ratios - Sawtimber-Size Trees:

<u>Species</u>	<u>Ratio</u>
P	4.9
D	4.8
S	4.9
AF	4.6
LP	4.6

b. Board Foot - Cubic Foot Ratio for Pole-Size Trees:

2.5 Board Feet = 1 Cubic Foot

c. Cubic Foot - Cord Ratio for Pole-Size Trees:

90 Cubic Feet = 1 Cord

d. Board Foot - Cord Ratios:

1. Sawtimber-Size Trees:

2 Cords = 1 M Board Feet

2. Pole-Size Trees:

3 Cords = 1 M Board Feet

PERIODIC ANNUAL INCREMENT AND MORTALITY BY TYPES<sup>1/</sup>  
POLE AND SAWTIMBER STANDS  
 (Nonreserved National-Forest Lands)

Appendix Table 15

Beartooth Working Circle

Forest Type	Com'l Forest Area (acres)	Gross PAI <sup>2/</sup> /Acre (CF)	Mort. /Acre (CF)	Net PAI /Acre (CF)	Percent Volume Sawt.	Net PAI /Acre (CF)	Cu.Ft. Bd.Ft. Ratio	Mort. Sawt. /Acre (BF)	Net PAI /Acre (BF)	Total Sawt. Mort. (MBF)	Total Net PAI Sawt. (MBF)	Other (MCF)
D9W	5,980	23	10	13	73.5	9.5	4.8	48	46	287	275	21
D9M	12,980	26	5	21	73.5	15.4	4.8	24	74	311	960	73
D9P	8,650	9	6	3	73.5	2.2	4.8	29	11	251	95	7
D-P8WM	14,705	43	-	43	13.8	6.1	4.8	-	29	-	426	543
D-P8P	610	10	-	10	13.8	1.4	4.8	-	7	-	4	5
Subtotal	42,925									849	1,760	649
LP8&9W	17,445	49	2	47	22.1	10.4	4.6	9	48	157	837	638
LP8&9M	11,700	16	1	15	22.1	3.3	4.6	5	15	58	175	137
LP8&9P	4,710	10	-	10	22.1	2.2	4.6	-	10	-	47	37
Subtotal	33,855									215	1,059	812
S-AF8&9WM	17,018	22	5	17	65.5	11.1	4.8	24	53	108	902	100
S-AF8&9P	7,428	21	2	19	65.5	12.4	4.8	10	60	74	446	49
Subtotal	24,446									482	1,348	149
TOTAL	101,226									1,546	4,167	1,610
Average per Acre per Year										15	41	16

<sup>1/</sup> Based on average PAI past 10 years and average annual mortality past 5 years.

<sup>2/</sup> Volume increase of growing stock trees at end of ten-year period.



PRESENT MEAN ANNUAL INCREMENT BY TYPES  
(Nonreserved National-Forest Lands)

Appendix Table 16

Beartooth Working Circle

Forest Type	Commercial Forest Area (acres)	Sites (percent)	Actual Stocking (percent)	Mean Annual Increment <sup>1/</sup>				
				Sawt. (BF per acre)	Total (MBF)	Pole (CF per acre)	Total (MCF)	Total (MBF)
D-P	44,235	IV	-	66	2,919	4.9	217	-
LP	61,412	IV-V	-	59	3,623	7.1	436	-
S	11,225	IV	-	58	651	4.3	48	-
AF	<u>13,761</u>	IV	-	31	<u>427</u>	5.0	<u>69</u>	-
TOTAL	130,633				7,620		770	

<sup>1/</sup> MAI obtained from growth of present sawtimber stands over period of their existence adjusted to present stocking or actual MAI.

SUSTAINED YIELD CAPACITY BY TYPES  
(Nonreserved National-Forest lands)

Appendix Table 17

Beartooth Working Circle

Forest Type	Rotation (years)	Site Class	Cum'l Forest Area (acres)	Normal MAI /Acre <sup>1/</sup>		Satisfactory MAI/Acre <sup>2/</sup>		Total Normal		Total Satisfactory	
				Sawt. (BF)	Pole (CF)	Sawt. (BF)	Pole (CF)	Sawt. (MBF)	Pole (MCF)	Sawt. (MBF)	Pole (MCF)
D-P	160	IV	44,235	96	13.2	67	9.2	4,246	594	2,964	407
LP	120	IV-V	61,412	117	14.0	82	9.8	7,185	860	5,036	602
S-AF	140	IV	24,986	160	22.4	112	15.7	3,998	557	2,798	392
TOTAL			130,633					15,429	2,011	10,798	1,401

<sup>1/</sup> From "Tables of Yields and Mean Annual Increment of Fully Stocked Stands in Major Forest Types of Region."

<sup>2/</sup> 70 percent of normal.

AREA OF AGE GROUPS BY TYPES AND STRATA  
(Nonreserved Commercial National-Forest Lands)

POLE AND SAWTIMBER STANDS

Appendix Table 18

Beartooth Working Circle

Age/ Groups	Acres of Major Forest Types								Total Acres
	D9W	D9M	D9P	D8W	LP8W	LP8M	S9M	S9P	
1- 20	-	-	-	-	-	-	-	-	-
21- 40	-	-	-	-	-	921	-	-	921
41- 60	-	-	-	1,206	5,163	5,531	-	-	11,900
61- 80	-	1,038	865	7,233	6,884	921	-	-	16,941
81-100	-	-	865	3,616	5,163	921	-	-	10,565
101-120	-	2,207	865	-	-	921	-	364	4,357
121-140	538	1,038	-	-	-	-	-	728	2,304
141-160	538	3,245	-	-	-	-	-	728	4,511
161-180	1,616	2,207	2,595	-	-	-	716	728	7,862
181-200	2,750	1,038	3,460	-	-	-	-	364	7,612
200+	538	2,207	-	-	-	-	6,444	728	9,917
TOTAL	5,980	12,980	8,650	12,055	17,210	9,215	7,160	3,640	76,890

1/ From inventory plots sampled in 1960.

PERCENT OF SITE CLASS BY FOREST TYPES (POLE AND SAWTIMBER STANDS ONLY)  
(Nonreserved Commercial National-Forest Lands)

Appendix Table 19

Beartooth Working Circle

Forest Type	Site		
	Good	Medium	Poor
	Percent		
D	-	-	100
LP	-	50	50
S	-	5	95

LOG GRADES BY SPECIES<sup>1/</sup>  
(Nonreserved Commercial National-Forest Lands)

Appendix Table 20

Species	Log Grades			
	1	2	3	4
	Percent			
D	-	1	24	75
LP	2	9	39	50
S	-	1	29	70

<sup>1/</sup> From 1960 inventory plots.

VOLUME OF SALVABLE DEAD AND USABLE CULL BY STRATA  
(Nonreserved Commercial National-Forest Lands)

Appendix Table 21

Forest Type	Area (acres)	Salvable Dead		Usable Cull		Total Usable (cords)
		Per Acre (cords)	Total (cords)	Per Acre (cords)	Total (cords)	
D9W	5,980	3.0	17,940	1.5	8,970	26,910
D9M	12,980	3.0	38,940	1.0	12,980	51,920
D9P	8,650	2.0	17,300	1.0	8,650	25,950
D8W&M	-	-	-	-	-	-
LP8W	17,445	0.5	8,720	0.2	38,890	47,610
LP8M	11,700	2.0	23,400	0.5	5,850	29,250
S9M	17,018	3.0	51,050	2.0	34,030	85,080
S9P	7,428	2.0	14,850	1.0	7,430	22,280
TOTALS			172,200		116,800	289,000

CALCULATION OF ANNUAL ALLOWABLE HARVEST CUT OF SAWTIMBER  
(Nonreserved National-Forest Commercial Forest Lands)

Appendix Table 22

Beartooth Working Circle

A. KEMP FORMULA      AAC =  $(\frac{7Am + 5Ap + 3As + Ar}{4R}) Vm$

Am = Area of sawtimber stands      AAC = Annual Allowable Cut  
 Ap = Area of pole stands      R = Rotation  
 As = Area of seedling & sapling stands      4 = Number of stands  
 Ar = Area restocking      Vm = Average volume per acre of sawtimber stands

Forest Type	Rotation (years)	Area Calculation	SAWTIMBER		
			Area (acres)	Per Acre (BF)	Total (MBF)
D-P	160	$AAC = \frac{(7 \times 27,610) + (5 \times 15,315) + 3(1250) + 0}{4 \times 160} =$	427	x 10,428	= 4,453
LP	120	$AAC = \frac{(7 \times 4,045) + (5 \times 12,880) + 3(1695) + (460)}{4 \times 120} =$	205	x 9,493	= 1,946 <sup>1/2</sup>
S	140	$AAC = \frac{(7 \times 10,930) + (5 \times 250) + 3(45) + 0}{4 \times 140} =$	139	x 11,044	= 1,535
AF	140	$AAC = \frac{(7 \times 10,341) + (5 \times 2,925) + 3(495) + 0}{4 \times 140} =$	195	x 5,772	= 1,126
TOTAL			966		9,060

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<sup>1/2</sup> Total acreage used. 50 percent of acreage is on poor site quality incapable of producing sawtimber.



Appendix Table 22 (Continued)

Beartooth Working Circle

## OTHER PRODUCTS

Forest Type	Rotation (years)	Annual Cutting Area (acres)	Ave. Vol./Acre Other Products (cu.ft.)	(MCF)	AAC (cords)
D-P	160	427	781	333	3,700
LP	120	205	1,131	232	2,577
S	140	139	839	117	1,300
AF	140	195	757	148	1,644
LP (cordwood only) ( $\frac{1}{2}$ area total area) $\frac{1}{2}$					
AAC = $\frac{(5 \times 16,930) + (3 \times 1,690) + 0}{3 (120)} =$					
		249	1,650	410	4,555
TOTAL		1,215		1,240	13,776

$\frac{1}{2}$  Total acreage used. 50 percent of acreage is on poor site quality incapable of producing sawtimber.

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## B. VON MANTEL FORMULA

$$AAC = \frac{2 Ga}{R}$$

AAC = Annual Allowable Cut

Ga = Volume of total growing  
stock (in cubic feet)

R = Rotation

Forest Type	Rotation (years)	Sawtimber	Total AAC (MCF)	Prop. Sawt. (percent)	Conv. Factor	Annual Allowable Cut			
						(MCF)	(MBF)	(MCF)	(cords)
D-P	160	$AAC = \frac{2 (108,804)}{160} =$	1,360	73.5	4.8	1,000	4,800	360	4,000
LP	120	$AAC = \frac{2 (62,082)}{120} =$	1,035	22.1	4.6	229	1,053	806	8,955
S	140	$AAC = \frac{2 (34,909)}{140} =$	499	73.4	4.8	366	1,757	133	1,477
AF	140	$AAC = \frac{2 (24,191)}{140} =$	345	62.3	4.7	215	1,010	130	1,444
TOTAL			3,239			1,810	8,620	1,429	15,876

1/ 90 cubic feet = 1 cord

Appendix Table 22 (Continued)

Beartooth Working Circle

C. HANZLIK FORMULA

$$AAC = \frac{V_m}{R} + I$$

$V_m$  = Vol. of growing stock  
over rotation age

$R$  = Rotation

$I$  = Mean annual increment

Forest Type	Rotation	Sawtimber (MBF)	Poletimber (MCF)
D-P	160	$AAC = \frac{287,917}{160} + 2,919 = 4,718$	$AAC = \frac{21,563}{160} + 217 = 352$
LP	120	$AAC = \frac{38,399}{120} + 3,623 = 3,943$	$AAC = \frac{4,575}{120} + 436 = 474$
S	140	$AAC = \frac{120,711}{140} + 651 = 1,513$	$AAC = \frac{9,170}{140} + 48 = 113$
AF	140	$AAC = \frac{59,688}{140} + 427 = 753$	$AAC = \frac{7,828}{140} + 69 = 125$
TOTAL		10,927	1,064

VOLUME OF GROWING STOCK OVER ROTATION AGE

Forest Type	Area Sawt.	Area over Rotation Age R years		Volume per acre		Total Volume over R years	
		acres	percent	Sawt. (BF)	Pole (CF)	Sawt. (MBF)	Pole (MCF)
D-P	27,610	16,411	59.5	10,428	781	287,917	21,563
LP	4,045	4,045	100.0	9,493	1,131	38,399	4,575
S	10,930	9,838	90.0	11,044	839	120,711	9,170
AF	<u>10,341</u>	<u>9,000</u>	87.0	5,772	757	<u>59,688</u>	<u>7,828</u>
TOTAL	52,926	39,294				506,715	43,136

Ca = Actual growing stock  
Gr = Realizable growing stock  
R = Rotation

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## Appendix Table 22 (Continued)

Beartooth Working Circle

Forest Type	Rotation	Allowable Annual Cut	
		Growth Computations	Allowable Cut Calculations
	Age	Normal Yields (BF Scribner)	(MBF)
LP	120	-	AAC = 3,623 + $\frac{63,901-78,250}{120}$ = 3,503
	Site IV-	305	
	V	1,610	
	60	2,875	
	80	3,915	
	100	2,362 ( $\frac{1}{2}$ normal)	
	120	11,067	
	TOTAL	11,067	
		Gr = $\frac{11,067 \times .70 \times 20}{120}$ = 1,291 /acre	
		Gr = 1,291 x 61,412 = 79,283 M cu.ft. (Total)	
		Gr = 79,283 x .21 = 16,649 M cu.ft. (Sawt.)	
		Gr = 16,649 x 4.7 = 78,250 M bd.ft. (Sawt.)	

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Appendix Table 22 (Continued)

Beartooth Working Circle

Forest Type	Rotation	Allowable Annual Cut			
		Age	Growth Calculations Normal Yields (BF Scribner)	Allowable Cut Calculations (MBF)	
S	140 Site IV	20	-	AAC = 651 + $\frac{121,457-45,090}{140}$ = 1,196	
		40	30		
		60	50		
		80	2,530		
		100	9,050		
		120	17,280		
		140	11,235 ( $\frac{1}{2}$ normal)		
		TOTAL	40,175		
		Gr = $\frac{40,175 \times .70 \times 20}{140}$ = 4,017 /acre			
		Gr = 4,017 x 11,225 = 45,090 M bd.ft.			

(Continued on next page)

Appendix Table 22 (Continued)

Beartooth Working Circle

Forest Type	Rotation	Allowable Annual Cut	
		Growth Computations	Allowable Cut Calculations
		Normal Yields (BF Scribner)	(MBF)
AF	140 Site IV	Age	
		20	AAC = 427 + $\frac{61,776-55,278}{140}$ = 473
		40	
		60	
		80	
		100	
		120	
		140	
		TOTAL	
		40,175	
		Gr = $\frac{40,175 \times .70 \times 20}{140}$ = 4,017 /acre	
		Gr = 4,017 x 13,761 = 55,278 M bd.ft.	
AAC TOTALS FOR ALL TYPES			
9,117 MBF			

## E. TABULAR CHECK

Tentative AAC: 8.5 MMBF. Average Rotation: 137 yrs. Forest Types: All

Present Age Group	Average Cutting Age	Com'l Forest Area	PAI or MAI	Vol./acre at Ave. Cutting Age	Total Volume to Cut	Years to Cut		Area Cut per Year
(years)	(years)	(acres)	(BF)	(BF)	(MMBF)	(yrs)	(yrs)	(acres)
200+	200+	16,047	↑ 41 <sup>1/</sup>	Res-9,575 Gr- 369	153.6 5.9	19	19	845
190	215	9,612	41	Res-9,575 Gr- 1,025	92.0 9.8	12	31	800
170	207	9,862	41	Res-9,575 Gr- 1,517	94.4 15.0	13	44	760
150	198	6,556	41	Res-9,575 Gr- 2,009	62.8 13.2	9	53	730
130	186	4,304	41	Res-9,575 Gr- 2,296	41.2 9.9	6	59	720
110	172	4,698	41	Res-9,575 Gr- 2,542	45.0 11.9	7	66	675
90	159	13,565	41	Res- 955 Gr- 2,829	12.9 38.4	6	72	2,270
70	148	19,576	↓ 62	Res- 955 Gr- 4,898	18.7 95.9	13	85	1,500
50	144	18,395	↑ 82 <sup>2/</sup>	Res- 955 Gr- 7,708	17.6 141.8	19	104	970
30	142	14,951	82	Res- 0 Gr- 9,184	0 137.3	16	120	935
10	137	12,092	82	Res- 0 Gr-10,414	0 125.9	15	135	810
Restock	130	975	↓ 82	Res- 0 Gr-11,152	0 10.8	1	136	975
TOTAL		130,633						

<sup>1/</sup> PAI for both sawtimber and pole stands (see Appendix Table 15)<sup>2/</sup> MAI for 70 percent stocking (see Appendix Table 17)

CALCULATION OF ANNUAL ALLOWABLE INTERMEDIATE CUT  
National-Forest Land (Nonreserved)

Appendix Table 23

Beartooth Working Circle

ANNUAL ALLOWABLE AREA TO CUT

Well-Stocked Strata	Commercial Forest (acres)	Area Under Rotation Age		Area to Cut Annually (acres)
		(percent)	(acres)	
<u>Sawtimber</u>				
D9W	5,980	18	1,076	54
LP9W	235	0	0	0
S9W	130	0	0	0
AF9W	550	0	0	0
<u>Poletimber</u>				
D-P8W	12,110	100	12,110	605
LP8W	17,210	100	17,210	860
S8W	200	100	200	10
AF8W	1,570	100	1,570	75
TOTALS	37,985		32,166	1,604

AVERAGE VOLUME PER ACRE

Well-Stocked Strata	Volume Per Acre		Assumed Cut <sup>1/</sup> (percent)	Volume to Cut Per Acre		
	Sawt. (MBF)	Pole (CF)		Sawt. (MBF)	Poletimber (CF)	(cords) <sup>2/</sup>
<u>Sawtimber</u>						
D9W	17.9	960	25	4.5	240	2.7
<u>Poletimber</u>						
D-P8W	1.2	1,690	25	.3	420	4.7
LP8W	.7	1,720	25	.2	430	4.8
S8W	3.2	1,450	25	.8	360	4.0
AF8W	.9	1,430	25	.2	360	4.0

<sup>1/</sup> Percentage of cut most appropriate for stands tending to be overstocked.

<sup>2/</sup> 90 cubic feet = 1 cord

ANNUAL ALLOWABLE INTERMEDIATE CUT

Well-Stocked Strata	Area to Cut Annually ( <u>acres</u> )	Volume to Cut		
		Sawtimber ( <u>MBF</u> )	Poletimber ( <u>MCF</u> )      ( <u>cords</u> )	
<u>Sawtimber</u>				
D9W	54	243	13	146
<u>Poletimber</u>				
D-P8W	605	181	254	2,843
LP8W	860	172	370	4,128
S8W	10	8	4	40
AF8W	75	15	27	300
TOTAL	1,604	619	668	7,457



CORRELATED SUMMARY OF ESTIMATED TIMBER HARVEST AND SALES PROGRAM  
(Reference FSH 2412.5)

Appendix Table 24

Date 1/25/61

		In millions of board feet														
		Actual cut and sold, first half F.Y. 1961		Status of cumulative cut	Distribution of estimated cut and sell											
		Sold	Cut		Last half F.Y. 1961		Fiscal year									
Working Circle		Product			1962	1963	1964	1965	1966							
					Sell	Cut	Sell	Cut	Sell	Cut	Sell	Cut	Sell	Cut		
Bear-tooth	11"+	1.0	.1	-	.5	.2	1.7	1.0	5.2	1.8	.2	2.8	.2	2.2	2.2	
	11"-	1.0	.1	-	.5	.2	1.7	1.0	5.2	1.8	.2	2.8	.2	2.2	2.2	
	Total	2.0	.2	-												

UNCUT VOLUME UNDER CONTRACT AVAILABLE FOR CUTTING  
(Reference FSH 2412.5)

Appendix Table 25

Beartooth Working Circle  
Date 1/25/61

Com- part- ment No.	Name of sale	Date sold	In millions of board feet						Distribution of uncut balance				
			Total volume of sale	Uncut volume		Volume marked	Volume scaled	1/1 to 6/30/61	FY 1962	FY 1963	FY 1964	FY 1965	FY 1966
				Total volume	Volume								
	Under \$300												
All	Miscellaneous 2400-4 sales	1959-60	.2	.2	.2	.2	.2	.1	.1				

PROPOSED CUT AND SELL PLANS  
(Reference FSH 2412.5)

Beartooth Working Circle  
Date 1/25/61

Appendix Table 26

Com- part- ment No.	Name of sale	In millions of board feet											
		Last half FY 1961		FY 1962		FY 1963		FY 1964		FY 1965		FY 1966	
		Sell	Cut	Sell	Cut	Sell	Cut	Sell	Cut	Sell	Cut	Sell	Cut
All	Under \$300												
	Miscellaneous 2400-4	.1	.1	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
	\$300 - \$2000 Stephens Draw	.4			.4								
2-13	\$2000 - 2 MM Crooked Creek Divide			1.5	.3	.6	.6		.6				
	2 MM - 5 MM Crooked Creek					5.0	1.0		2.0		2.0	5.0	2.0
	West Fork Stillwater												
		.5	.1	1.7	.9	5.2	1.8	.2	2.8	.2	2.2	5.2	2.2

TIMBER ACCESS ROADS--DETAILS BY PROJECTS  
(Reference FSH 2412.5)

Beartooth Working Circle  
Rock Creek District  
Date 1/25/61

Appendix Table 27

Com- part- ment No.	Name of sale	Road proj- ect No.	Kind of work planned	Planned FY 1962			Proposed FY 1963			Proposed FY 1964			Road survey	
				Miles	Estimated Cost (M\$)		Miles	Estimated Cost (M\$)		Miles	Estimated Cost (M\$)		Type Planned	Date of comple- tion
					Govt.	Oper- ator		Govt.	Oper- ator		Govt.	Oper- ator		
10	Crooked Creek	3085	C	2	10	6	3	15	9	1	1	1	1	6/30/62 6/30/62

FIVE-YEAR RIGHT-OF-WAY REQUIREMENTS

Appendix Table 28

F.Y. 1962 through F.Y. 1967

Beartooth Working Circle

Block or District	Proposed Sale	Road Number	General Location of Rights-of-Way	Land Owners	Date of Construction
Red Lodge	Crooked Creek	3085	Sec. 27, 28, T. 7 S., R. 26 E; 1/2 mile through HES #166; 3/4 mile through HES #593.	Frank Harman	1964
			Sec. 27, T. 7 S., R. 26 E.; 1/4 mile through HES #244; 1/8 mile through HES #262.	Greenough	



The following from the original have not been reproduced:

Map of Compartment and Block Boundaries

" " Burned Area

" " Roads (Primary & Secondary)





